

City of Carlsbad

Noise Guidelines Manual



September 1995

September 1995

City of Carlsbad

Noise Guidelines Manual

**Prepared By:
Nolte and Associates, Inc.**

This document may be amended when new information becomes available.

NOISE GUIDELINES MANUAL

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	i
I. INTRODUCTION	1
II. NOISE ELEMENT POLICIES	3
III. NOISE SCIENCE	7
Introduction	7
Definition	7
Quantifying Noise	8
Combining Decibels	10
Perception of Noise	12
Noise Descriptors	12
Noise Barriers	13
Noise Mapping	14
Harmful Effects of Noise	16
IV. PROJECT PROCESSING PROCEDURES	18
Guidelines for Complying with City Noise Policies	18
Procedure Used by the City to Evaluate Potential Noise Impacts	24
Project Review Considerations	26
V. CITY PREFERRED METHODS OF MITIGATING NOISE	30
Guidelines for Reducing Noise	30
VI. NOISE REPORTS	37
Types of Noise Reports	37
VII. CONDITIONS OF APPROVAL	40
VIII. DEFINITIONS	41

IX. TECHNICAL APPENDIX	<u>Page</u>
A. STATE NOISE REQUIREMENTS	
1. California Health and Safety Code	A-1
2. California Code of Regulations Title 24, Part 2, "Noise Insulation Standards"	A-1
3. California Code of Regulations Title 21 (Airport) "Noise Standards"	A-2
4. California Noise Insulation Standards	A-3
5. Sound Transmission Control (Ch. 35)	A-10
B. NOISE CONTOUR MAPS (REDUCED SIZE)	
1. Existing Noise Contours (1990)	B-1
2. Future Noise Contours (2010)	B-2
C. VEHICULAR NOISE ASSESSMENT	
1. FHWA-RD-77-108	C-1
2. Hard (Reflective) Sites - Soft (Absorbing) Sites	C-1
3. Determination of "Hard" Site Versus "Soft" Site	C-2
4. City of Carlsbad Traffic Mix	C-3
5. Distances to Roadway CNEL Contours - Existing and Future . . .	C-6
6. Distances to Roadway CNEL Contours - Future	C-8
D. RAIL NOISE ASSESSMENT	
Railroad Noise Assessment - Wyle Laboratories Report WCR 73-5 . . .	D-1
E. McCLELLAN PALOMAR AIRPORT	
1. Airport Influence Area Map	E-1
2. Palomar Airport Noise Control Plan	E-2
F. RELATIONSHIP OF NOISE ENERGY AND NOISE PERCEPTION TO DECIBEL SCALE	F-1
G. CONSTRUCTION EQUIPMENT NOISE LEVELS	G-1
H. PROFESSIONAL QUALIFICATIONS FOR ACOUSTICAL CONSULTANTS (City of Carlsbad)	H-1

I. FORMS

1.	Notice Concerning Proximity of the Planned or Existing transportation corridor(s)	I-1
2.	Notice Concerning Aircraft Environmental Impacts	I-4
3.	Aircraft Noise Notification Signs	I-7
4.	Notice of Aircraft Noise Impact Area	I-9

J. NOISE REPORT APPLICATION AND CHECKLIST

1.	Noise Report Submittal Form	J-1
2.	Application Requirements for Noise Report Application	J-2
3.	Noise Report: Staff Review Checklist	J-5

LIST OF FIGURES

	<u>Page</u>
FIGURE - i CARLSBAD FUTURE 2010 NOISE CONTOUR MAP	iv
FIGURE - ii 1995 NOISE CONTOUR MAP OF McCLELLAN PALOMAR AIRPORT	v
FIGURE - iii LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS MATRIX	vi
FIGURE III-1 TYPICAL SOUND LEVELS IN dBA	9
FIGURE III-2 DIFFERENCE IN DECIBELS BETWEEN TWO LEVELS BEING ADDED	11
FIGURE III-3 NOISE CONTOURS	15
FIGURE III-4 SPEECH COMMUNICATION AS A FUNCTION OF BACKGROUND NOISE LEVEL	17
FIGURE IV-1 LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS	25
FIGURE IV-2 DEVELOPMENT REVIEW PROCESS FOR NOISE EVALUATION . .	29
FIGURE V-1 NOISE SENSITIVE SITE DESIGNS	31
FIGURE V-2 NOISE SENSITIVE SITE DESIGN	32
FIGURE V-3 NOISE MITIGATION THROUGH USE OF TOPOGRAPHY	33
FIGURE V-4 NOISE MITIGATION THROUGH ARCHITECTURAL LAYOUT	35
FIGURE V-5 NOISE BARRIER ALTERNATIVES	36
FIGURE VI-1 ONE STEP COMPLETE NOISE REPORT SUBMITTAL PROCESS . .	38
FIGURE VI-2 PHASED NOISE REPORT SUBMITTAL PROCESS	39

LIST OF TABLES

	<u>Page</u>
TABLE - i NON-RESIDENTIAL INTERIOR NOISE GUIDELINES	ii
TABLE - ii SUMMARY OF NOISE ISSUES ADDRESSED IN THE CARLSBAD MUNICIPAL CODE	iii
TABLE I-1 SUMMARY OF NOISE ISSUES ADDRESSED IN THE CARLSBAD MUNICIPAL CODE	1
TABLE III-1 PERCEPTION OF NOISE	12
TABLE IV-1 GUIDELINES FOR NON-RESIDENTIAL INTERIOR NOISE LEVELS . .	20
TABLE IV-2 SUMMARY OF SUGGESTED METHODS OF COMPLYING WITH CITY NOISE POLICIES	23



SUMMARY

SUMMARY

The following is a summary of the most frequently requested City noise policies. Information contained in this summary is described in more detail in the body of the Noise Guidelines Manual.

Residential Exterior Noise Standard

It is the policy of the City that 60 decibel dB(A) CNEL is the exterior noise level to which residential units must be mitigated, except that for areas impacted by McClellan Palomar Airport shall be mitigated to 65 decibel dB(A) CNEL.

Residential Interior Noise Standard

Interior noise levels for all residential units shall be mitigated to 45 dB(A) CNEL when openings to the exterior of the residence are closed. If openings are required to be closed to meet the interior noise standard then mechanical ventilation shall be provided.

Threshold for Requiring Noise Reports on Residential Project

A noise report shall be required for all residential projects within the following noise referral zones (refer to the Carlsbad Future 2010 Noise Contour Map Figure-i or see the 1000' scale map¹ provided at the back of this document):

- a. Residential projects requiring a discretionary permit containing five or more dwelling units or any multiple family dwelling units located within or 500-feet beyond the 60 dB(A) CNEL noise contour line of the Noise Contour Map approved as part of the Carlsbad General Plan.
- b. Within the McClellan-Palomar Airport 60 dB(A) CNEL Noise contour line as shown on the 1995 Noise Contour Map of the McClellan-Palomar Airport Comprehensive Land Use Plan (CLUP) see Figure-ii.

¹1000' scale map will be included in final document only.

Findings Necessary to Exceed Residential Noise Standards

If the acoustical study shows that exterior or interior noise levels cannot be mitigated to the established standard as noted above (60 or 65 dB(A) CNEL or less for the exterior portion of residential projects, or 45 dB(A) CNEL or less for interior portions of residential units), the development shall not be approved without the following findings:

- a. The developer of the project has proved to the satisfaction of the Planning Commission or Design Review Board that it is not feasible to comply with the standard.
- b. The Planning Commission or Design Review Board must find that there are specifically identified overriding social and economic considerations which warrant approval of the development even though it does not meet the noise standard.
- c. All purchasers of the impacted property shall be notified in writing prior to purchase, and by deed disclosure in writing, that the property they are purchasing is noise impacted and does not meet Carlsbad noise standards for residential property.

In addition, appropriate mitigation and/or conditions of approval shall be incorporated into the project in accordance with the Carlsbad Noise Guidelines Manual.

Non-Residential Exterior Noise Guidelines

The guidelines for maximum exterior noise levels for non-residential uses are provided in the Land Use Compatibility For Community Noise Environments Matrix (see Figure-iii). Non residential noise will be primarily regulated through the project review and approval process.

Non-Residential Interior Noise Guidelines

TABLE - i
NON-RESIDENTIAL INTERIOR NOISE GUIDELINES

<u>TYPICAL USE</u>	<u>Leq (h) dB(A)</u>
Church Sanctuary, Preschool, Schools, Fire Station Sleeping quarters, etc	45
General Office, General Commercial, Heavy Commercial, etc.	55
Planned Industrial, General Industrial, etc.	65

Measurement Location for Determining Noise Levels

Proposed projects are to mitigate the projected build-out noise level to a maximum as described above at:

- a. 5-feet above finished grade level; and
- b. 20-feet from the rear/side of the structure, unless the rear/side yard is less than 20-feet deep where the measurement shall be at the property line. (Where the useable rear/side yard is less than 20-feet deep, the measurement may be taken at the back of the useable rear/side yard, as may be approved by the Planning Director.)

where exterior space above the first floor/story of a residential structure is proposed to be used to meet Planned Development (PD) recreational space standards as required pursuant to Chapter 21.45, of the Carlsbad Municipal Code, the exterior space shall be mitigated to the City standard in order to receive credit as recreational space.

Noise Issues not Addressed in the Noise Guidelines Manual

The Noise Guidelines Manual is intended to primarily address community noise issues related to land use. The Noise Guidelines Manual does not address noise issues such as animal noise, noise from parties and loud gatherings, motor vehicle noise or general nuisance noise. If you are interested in finding out how the City deals with these noise issues please see the appropriate Carlsbad Municipal Code section (CC §) as noted below or contact the Carlsbad Planning Department.

TABLE - ii
SUMMARY OF NOISE ISSUES ADDRESSED IN THE CARLSBAD MUNICIPAL CODE

NOISE TYPE	CARLSBAD MUNICIPAL CODE SECTION
Animal Noise	CC § 7.04
Parties/Loud Gatherings	CC § 3.36
Construction	CC § 8.48 *
Motor Vehicles	CC § 8.28
General Nuisance Noise	Not Regulated by Ordinance

CC § Carlsbad Municipal Code Section

* The Noise Guidelines Manual briefly addresses construction noise see Page 22 of this Manual.

FUTURE NOISE EXPOSURE CONTOURS

This exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

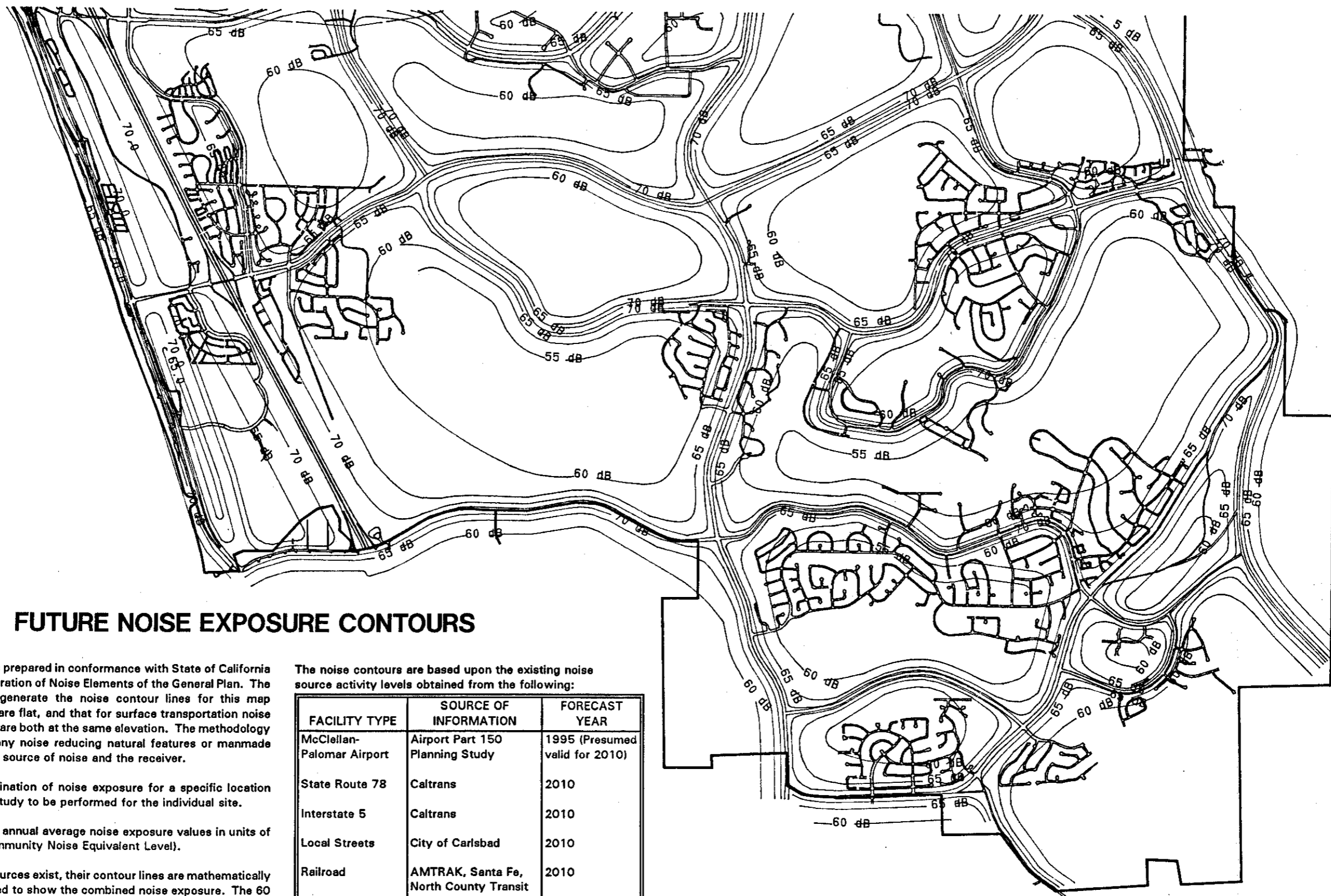
A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

Where multiple noise sources exist, their contour lines are mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour for McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70 and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	FORECAST YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1995 (Presumed valid for 2010)
State Route 78	Caltrans	2010
Interstate 5	Caltrans	2010
Local Streets	City of Carlsbad	2010
Railroad	AMTRAK, Santa Fe, North County Transit Development	2010



FUTURE NOISE EXPOSURE CONTOURS

This exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

Where multiple noise sources exist, their contour lines are mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour for McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70 and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	FORECAST YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1995 (Presumed valid for 2010)
State Route 78	Caltrans	2010
Interstate 5	Caltrans	2010
Local Streets	City of Carlsbad	2010
Railroad	AMTRAK, Santa Fe, North County Transit Development	2010

Source: Nolte & Associates, 1993

FIGURE - ii
1995 NOISE CONTOUR MAP OF MCCLELLAN PALOMAR AIRPORT

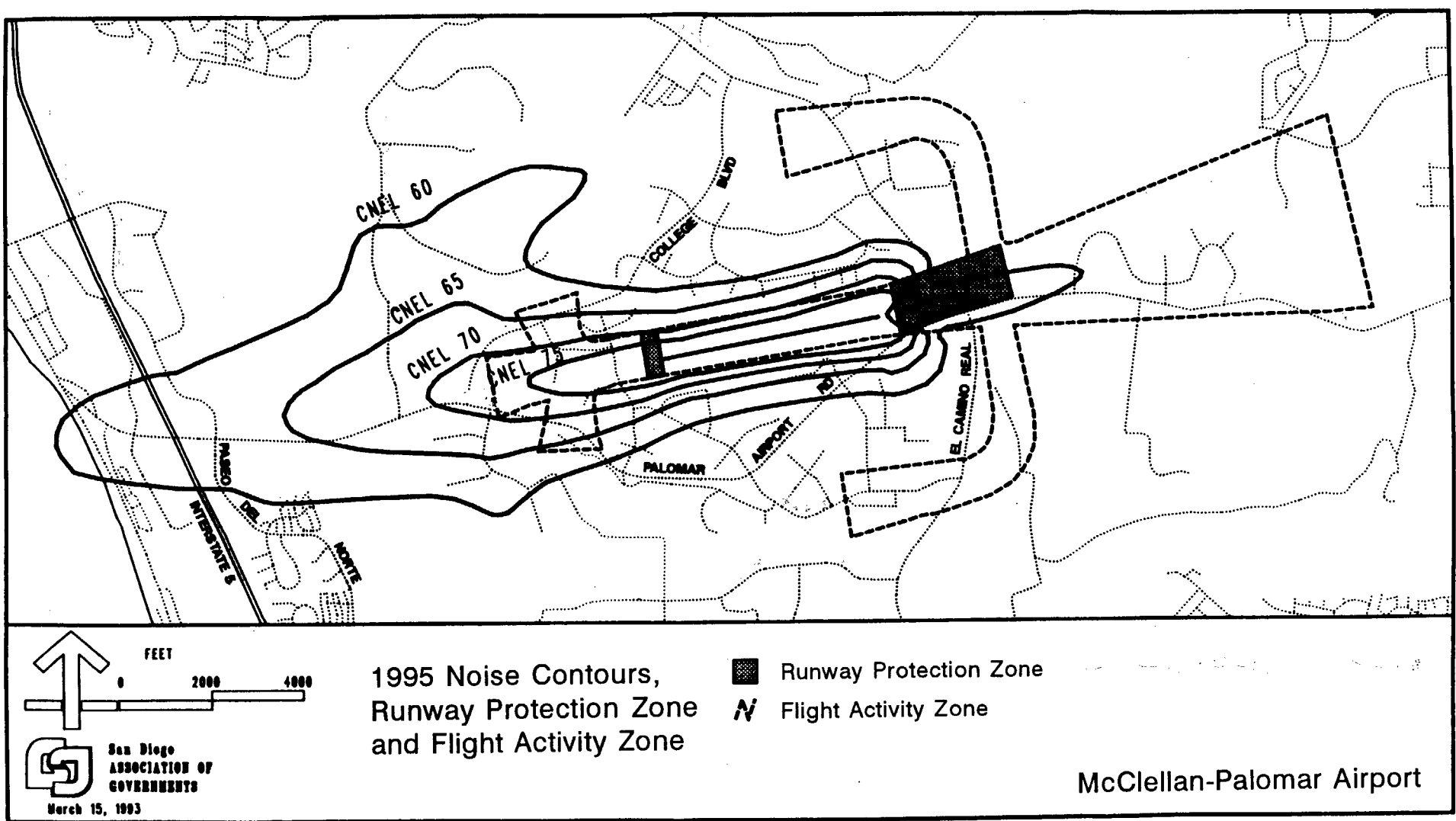
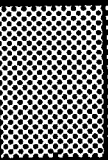
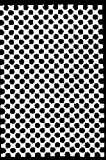




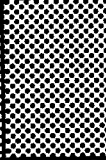

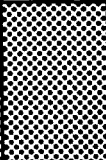
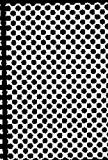





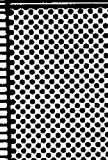
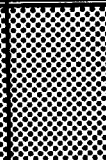

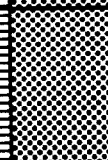



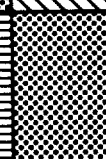


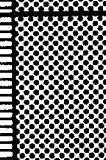





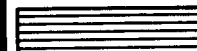
FIGURE - iii
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS MATRIX

Land Use Category	Community Noise Exposure CNEL, dB					
	55	60	65	70	75	80
Residential - (all) Single Family, Duplex, Mobilehome, Multi-Family, etc.						
Transient Lodging - Motel, Hotel						
School, Library, Church, Hospital, Nursing Home						
Auditorium, Concert Hall, Amphitheater						
Sports Arena, Outdoor Spectator Sports						
Playground, Neighborhood Park						
Golf Course, Riding Stable, Water Recreation, Cemetery						
Office Building, Business Commercial Planned Industrial and Professional						
General Industrial, Manufacturing, Utilities, Agriculture						

INTERPRETATION:



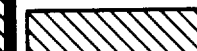
Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.



Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.



Normally Unacceptable
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.



Land Use Discouraged
New construction or development should generally not be undertaken.

NOTE: McClellan Palomar Airport Noise is regulated by the Airport Comprehensive Land Use Plan (CLUP). See the CLUP for airport noise compatibility guidelines.



I. INTRODUCTION

I. INTRODUCTION

Purpose

The purpose of the Noise Manual is to provide the user with guidelines and procedures to implement policies outlined in the Noise Element of the Carlsbad General Plan. That element establishes general policies and specific noise standards to achieve noise compatibility between land uses. This Manual contains the procedures necessary to ensure that these policies and standards are consistently and effectively applied during City review of a proposed project. These guidelines are intended to work in concert with the City's municipal code and the legislative requirements of various state and federal statutes. This Noise Manual will be of use to anyone interested in how the City addresses the issue of noise on a development proposal; it will not help those concerned with nuisance noise issues, barking dogs, motor vehicle noise emissions, loud parties or similar noise problems.

State Law

California State Law requires local governments to address noise issues in their planning process. To fulfill this responsibility, the state grants local governments significant powers to control noise-producing activity and to reduce or eliminate "noise problems", primarily by controlling land use. Cities may regulate certain land uses by Conditional Use Permit or zoning restriction. Cities may also establish land use or nuisance noise control ordinances and/or may enforce state or federal laws.

Noise Issues not Addressed in Manual

The Noise Guidelines Manual is intended to primarily address community noise issues related to Land Use. The Noise Guidelines Manual does not address noise issues such as animal noise, noise from parties and loud gatherings, motor vehicle noise, or general nuisance noise. If you are interested in finding out how the City deals with these noise issues please see the appropriate Carlsbad Municipal Code Section (CMC §) as noted below or contact the Carlsbad Planning Department.

TABLE I-1
SUMMARY OF NOISE ISSUES ADDRESSED IN THE CARLSBAD MUNICIPAL CODE

NOISE TYPE	CARLSBAD MUNICIPAL CODE SECTION
Animal Noise	CMC § 7.04
Parties/Loud Gatherings	CMC § 3.36
Construction	CMC § 8.48 *
Motor Vehicles	CMC § 8.28
General Nuisance Noise	Not Regulated by Ordinance

CMC § Carlsbad Municipal Code Section

* The Noise Guidelines Manual briefly addresses construction noise see Page 22 of this Manual.

Manual Format

The Noise Manual is divided into seven sections each of which are described briefly below:

Section I - Introduction Describes the purpose and intent of the Guidelines Manual and describes the general contents of this document.

Section II - Noise Element Policies Presents policies from the Noise Element of the Carlsbad General Plan that relate to achieving compatibility between community noise and land use.

Section III - Noise Science Provides basic information about noise which should enable the reader to understand what noise is, how noise is measured and mapped, how noise barriers work, and the potential harmful effects of noise.

Section IV - Noise Policy Compliance Procedures Identifies the steps in the discretionary application review process that deal with community noise issues.

Section V - Noise Reduction Provides guidance to the project designer regarding City preferred acoustical design efforts. Preferred methods to reduce noise levels are also discussed.

Section VI - Noise Study and Report Outlines the general requirements for noise study and report submittals.

Section VII - Conditions of Approval Describes under what circumstances conditions of approval may be required.

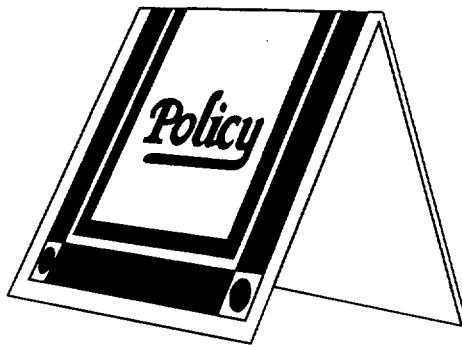


II. NOISE ELEMENT POLICIES

II. NOISE ELEMENT POLICIES

The Noise Element Policies section of this manual is intended to be used by project applicants, City staff, and the citizens of Carlsbad who are interested in finding out what the City of Carlsbad Noise Policies are relating to Land Use.

The City of Carlsbad, in fulfilling its State mandated responsibility to prepare and adopt a comprehensive General Plan for the City, has adopted a Noise Element. The Noise Element, along with six other mandated elements and two optional elements comprise the entire General Plan. While all of the elements are internally consistent and integrated with one another, some elements are more closely related. For example, the Circulation, Housing, and the Land Use Elements are all closely related to the Noise Element. The noise policies of the City are most closely related to land use policies. This Manual focuses on the land use/noise compatibility policies of Carlsbad. **This section of the manual presents the policies from the Noise Element that relate to achieving compatibility between community noise and land use. The policies are verbatim from the Noise Element.**



The following are excerpts from the Noise Element of the General Plan, of Land Use/Community Noise Related Objectives and Implementing Policies and Action Programs. The Objectives are denoted with the letter B and the Implementing Policies and Action Programs are denoted with the Letter C. For a complete listing of all Goals, Objectives, and Implementing Policies and Action Programs please see the Noise Element

Selected Land Use/Noise Compatibility Policies and Objectives from the Noise Element**IV. OBJECTIVES AND IMPLEMENTING POLICIES AND ACTION PROGRAMS****GENERAL****C. IMPLEMENTING POLICIES AND ACTION PROGRAMS**

C.1 Control harmful or undesirable sounds through the planning and regulatory process with emphasis on noise/land-use compatibility planning.

C.2 Review all development proposals, both public and private, for consistency with the policies of this element.

C.4 Continue to enforce building codes to ensure adequate sound insulation between dwellings and to ensure adequate sound insulation of interior areas from loud external noise sources. The City shall continue to enforce project conditions of approval related to noise control.

C.5 Attempt to control noise primarily at its source. Where this is not feasible, controls along the transmission path of the noise should be required.

LAND USE**B. OBJECTIVES**

B.1 To achieve noise compatibility between industrial/commercial and surrounding land uses and achieve an acceptable noise environment in industrial/commercial areas.

B.2 To achieve noise impact compatibility between land uses through the land use planning/development review process.

C. IMPLEMENTING POLICIES AND ACTION PROGRAMS

C.1 Encourage the development of compatible land uses in areas which are subject to excessive noise levels.

C.2 Develop specific noise standards for use in reviewing noise sensitive development.

C.3 Require the use of project design techniques, such as, increasing the distance between the noise source and the receiver; placing non-noise sensitive uses such as parking areas, maintenance facilities, and utility areas between the source and the receiver; using non-sensitive structures, such as a garage, to shield noise sensitive areas; and, orienting buildings to shield outdoor spaces from a noise source to minimize noise impacts during any discretionary review of a residential or other noise sensitive project.

C.5 Enforce the policy of the City that 60 dBA CNEL is the exterior noise level to which all residential units should be mitigated. Sixty-five (65) dBA CNEL is the maximum noise level to which residential units subject to noise from McClellan-Palomar Airport should be permitted. Additional disclosure actions (easements, deed restrictions, recorded notice, etc.) may be required of developers/sellers of noise impacted residential units.

For residential properties identified as requiring a noise study, a study shall be prepared by an acoustical professional. This study shall document the projected maximum exterior noise level and mitigate the projected exterior noise level to a maximum allowable noise level as identified in this policy.

Interior noise levels should be mitigated to 45 dBA CNEL when openings to the exterior of the residence are open or closed. If openings are required to be closed to meet

the interior noise standard, then mechanical ventilation shall be provided.

If the acoustical study shows that exterior noise levels cannot be mitigated to the level allowable as identified in this policy or less, the development should not be approved without one or more of the following findings:

1. Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect (noise).

2. Changes or alterations to avoid or substantially lessen the significant environmental effect (noise) are within the responsibility and jurisdiction of another public agency and not the City of Carlsbad. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

3. Specific economic, social, or other considerations make infeasible the mitigation measures or project alternatives to avoid or substantially lessen the significant environmental effect (noise).

If a project is approved with exterior noise levels exceeding the level allowable pursuant to this policy, all purchasers of the impacted property shall be notified in writing prior to purchase, and by deed disclosure in writing, that the property they are purchasing is, or will be, noise impacted and does not meet Carlsbad noise standards for residential property.

Notwithstanding project approval, no residential interior CNEL should exceed 45 dBA.

C.6 Require that a "Noise" Study be submitted with all discretionary applications for residential projects of five or more single family dwelling units or any multiple family dwelling units located within or 500-feet beyond the 60 dBA CNEL Noise Contour Lines

as shown on the Map 2: Future Noise Exposure Contour Map.

C.7 Enforce the policy of the City that site design techniques such as increasing the distance between the noise source and the receiver; placing non-noise sensitive uses such as parking areas, maintenance facilities and utility areas between the source and the receiver; using non-noise sensitive structures, such as a garage, to shield noise-sensitive areas; and orienting buildings to shield outdoor spaces from a noise source, be the first tool used to mitigate noise impacts on noise sensitive land uses rather than the construction of walls or berms.

C.8 Recognize that mitigation of existing or future noise impacts from Circulation Element roadways, AT&SF railroad or McClellan-Palomar Airport for existing or future development within the City, shall not be funded by the City. However, the City shall assist applicants with the processing of necessary permits for mitigating noise on private property, which permits may include right-of-way permits, encroachment permits, retaining wall permits and zoning variances. The City shall also assist property owners in the establishment of assessment districts, to fund noise mitigation improvements, in accordance with established City policies and procedures.

CIRCULATION

C. IMPLEMENTING POLICIES AND ACTION PROGRAMS

C.2 Consider noise impacts in the design of road systems and give special consideration to those road corridors in scenic or noise sensitive areas.

C.4 Apply the residential noise policies of this element in the review of proposals for the construction or improvement of any roadway, railroad, transit system or other noise producing facility.

AIRPORT**B. OBJECTIVES**

B.1 To minimize noise impacts on City residents, the City has planned for non-residential land uses within the 65 dBA CNEL Noise Contour of McClellan-Palomar Airport, as shown on Map 3: Airport Noise Contour Map.

B.2 To develop and enforce programs dealing with airport noise disclosure, aviation easements and noise control that provide for noise compatibility with surrounding land uses.

C. IMPLEMENTING POLICIES AND ACTION PROGRAMS

C.1 Encourage the development of compatible land uses and restrict incompatible land uses surrounding airport facilities.

C.2 Utilize the noise standards contained in the Comprehensive Land Use Plan (CLUP) for McClellan-Palomar Airport (on file in the Planning Department). However, the City reserves the right to deviate from the CLUP as provided for in State Public Utilities Code Section 21676.

C.4 Expect the airport to control noise while the City shall control land-use thus sharing responsibility for achieving and maintaining long-term noise/land-use compatibility in the vicinity of McClellan-Palomar Airport.

C.5 Discourage the development of residential projects with exterior noise levels in excess of 65 dBA CNEL as caused by airport/aircraft operations. The City recognizes that noise levels of 65 dBA CNEL, as caused by aircraft operations, are generally incompatible with developments of residential uses and such developments should not be permitted within the 65 dBA CNEL Airport Noise Contour (See Map 3: Airport Noise Contour Map). However, if residential projects are approved, the City will require Aviation Easements to be placed over

lots within new residential development projects located within the 65 dBA CNEL noise contour as mapped on Map 3: Airport Noise Contour Map.

RAIL**C. IMPLEMENTING POLICY AND ACTION PROGRAMS**

C.1 Apply the residential noise policies of this Element in the review and approval of the construction or improvement of railroad facilities.

C.2 Apply the noise mitigation guidelines of the Noise Guidelines Manual (on file in the Planning Department) to all proposed development within the 65 dBA CNEL Noise Contour line as depicted on Map 2: Future Noise Exposure Contour Map.

EMPLOYMENT**B. OBJECTIVES**

B.3 To encourage that all business entities operating in the City comply with all occupational Health and Safety laws, rules and/or regulations established by authorized city, county, state or federal agencies.

C. IMPLEMENTING POLICIES AND ACTION PROGRAMS

C.1 Participate in noise control and hearing conservation programs in all appropriate work environments owned, operated, or otherwise under the control of the City.

C.2 Promote that all persons responsible for operation of noise-producing equipment or processes, exercise reasonable care to minimize casual noise exposure to unprotected workers or passers-by to reduce risk of hearing damage.

C.3 Encourage and assist its employees in identifying and abating potential noise hazards on City owned or controlled property.



III. NOISE SCIENCE

III. NOISE SCIENCE

Introduction

The Noise Science section is intended to be used by anyone wishing to better understand noise. The information contained in this section ranges from simple to very technical. A wide range of information has been included in this section in an attempt to address the needs of all users of this Manual including project applicants, City staff, and the citizens of Carlsbad.

Sound is all around us. Many sounds are from natural sources. For example, the song of a bird, the crash of ocean surf, wind rustling through leaves, or the roar of a waterfall are sounds that most people will experience on one or more occasions during their lifetime. Although, the above sounds range from quiet to loud, most persons would consider these sounds to be pleasant or even desirable.

In an increasingly urbanized, mechanized, and technological society, however, many of the sources of sound are not from nature, but are caused by man and the machines and devices that are an integral part of modern civilization. These man-made sounds are usually considered unpleasant and undesirable. This type of sound is called *noise*.

This section provides basic noise information to help the reader understand the difference between sound and noise, how noise is measured and mapped, how noise barriers work, and the potential harmful effects of noise.

Definition

While people with normal hearing can generally describe sound and "know" what sound is from their sensory experience of it, we all have difficulty in defining and discussing various amounts of sound. It is even more difficult to relate exact physical changes in sound character to our human perception and response to sound energy.

We begin with the definition of sound. When an object vibrates it radiates part of its mechanical energy as very *tiny changes in pressure through an elastic medium such as air, water, or a solid*. The ear responds to this acoustic pressure change, usually in air, and provides a conversion to nerve impulses that are transmitted to the brain for interpretation as sound.

"Noise" is defined distinctly from "sound." Noise is a certain class of sound, simply, NOISE IS UNWANTED SOUND. This means that any sound which is unwanted is defined as noise.

Loud and soft, noisy and quiet, high and low-pitch are terms often used to describe sound. These terms are relative, however, and do not reflect the absolute volume of, or frequencies contained in sound perceived by people. Physically, sound is described by two attributes, amplitude and frequency.

- *Amplitude* (also power or loudness), is usually described in decibels (dB). The loudness of a sound depends on the pressure exerted by the sound waves. The greater the pressure, the louder the sound. The amplitude of most common sounds is between 30 and 100 decibels.

- **Frequency**, also referred to as pitch or tone, is described in Hertz (Hz) representing cycles per second. High frequency sounds are produced by rapidly vibrating objects and low frequency sounds by slowly vibrating objects. Human hearing is most sensitive to sounds with pitch in the range of speech and somewhat higher frequencies. This range is from approximately 125 Hz to 4000 Hz.

Noise can additionally be described by its time pattern or *temporal distribution*. Strictly speaking, sound is sound only when it is present; noise may be repetitive, intermittent, continuous, or randomly occurring with respect to time. This variable temporal behavior strongly contributes to sound being considered as noise, as most people find non-stationary sound more annoying.

As humans we like (or are neutral toward) most sounds; our lives may in fact depend upon a sound to stay alive. An example would be the blaring horn of the car we did not see as we were about to step into the street. Unfortunately, the very same horn can be noise if it is blowing for a reason other than to protect our immediate safety.

Just about all man-made sound can be defined as noise at one time or another. This would include the broad category of transportation noise (automobile, motorcycle, truck, railroad, boat, airplane); industrial/commercial/residential related noise, usually mechanical in origin (e.g., car wash, air conditioning compressor, pneumatic tools, power plant, cooling tower, portable generators or pumps); and "people" related noise sources such as amplified speech, crowd noise, a loud radio/stereo/TV, live amplified music, a carnival, a shooting range, or a car alarm. We call most natural and very soft man-made sound "background" or "ambient" sound. For purposes of this Manual, and the state planning law, we consider non-natural, medium to loud sound as noise. It is generally called environmental noise, or community noise.

Quantifying Noise

There are at least two ways to measure and describe quantities: absolute for example, inches, feet or miles, or relative for example, "my new house is twice as large as my old apartment", or "this sidewalk is 50% wider than the last one". Noise can be quantified either way, but it is easiest to use the relative method for noise. The relative value of two quantities used for noise level description, is always the same by international scientific agreement. The basic unit that we use to describe noise quantity is the decibel, abbreviated dB.

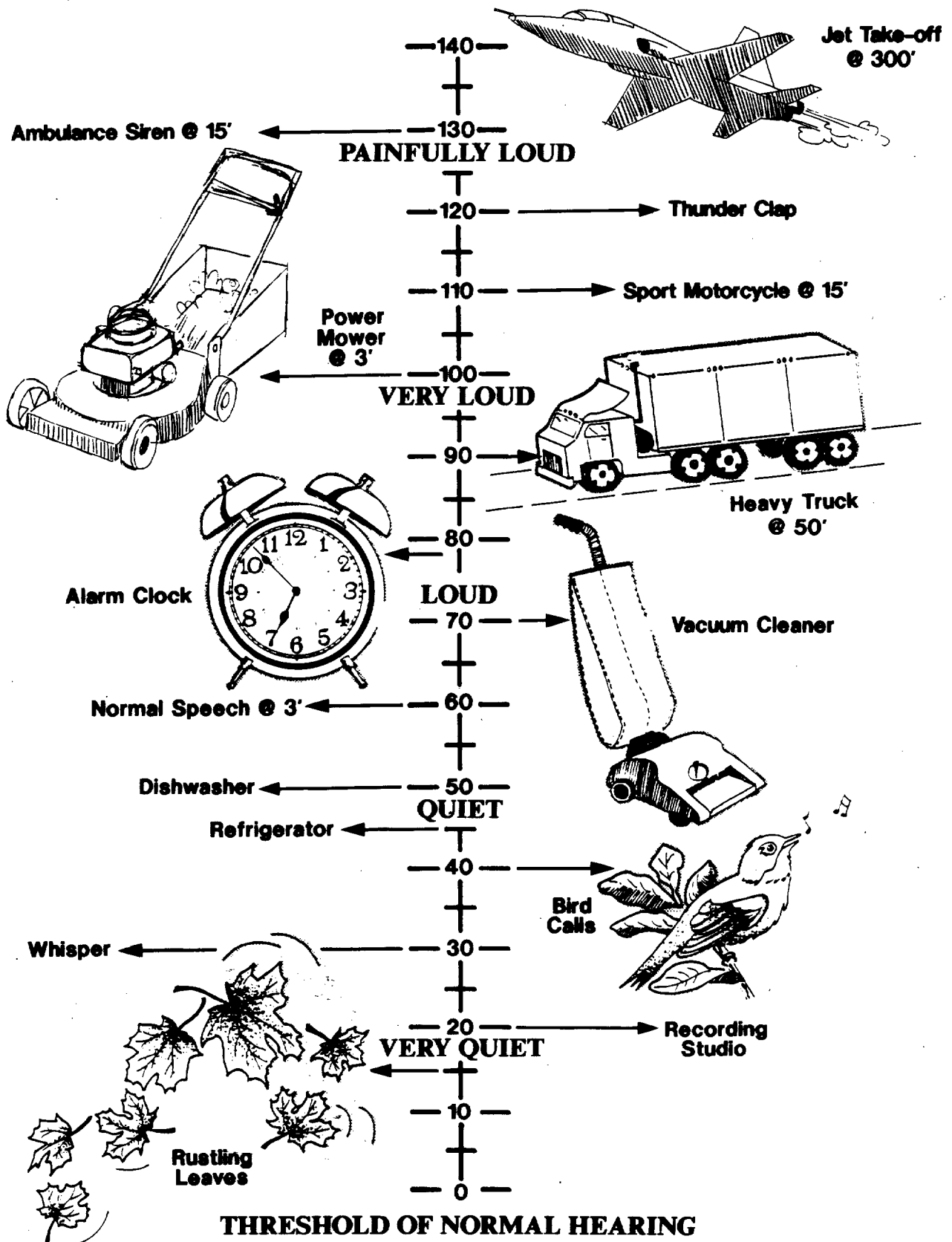
A Bel (named in honor of Alexander Graham Bell) could be used, but it is too big. It would be like trying to describe the length of a pencil in yards or feet, rather than inches. By using dB's we can also conveniently describe the important (to humans) range of noise levels with the numerical range of 0 dB to 140 dB. This range is from the softest sound we can sense to a painfully/damaging loud sound (See Figure III-1). The normal range of noise levels we experience on a day-to-day basis is from 30 dBA to (briefly) 110 dBA.

Decibels behave mathematically according to the laws of logarithms. Common rules are provided below; most books on algebra will discuss all the math details if you need additional information.

1. Two equal noise levels will add to give 3 dB more level than each of the original levels alone (e.g., 60 dB + 60 dB = 63 dB).

FIGURE III-1

TYPICAL SOUND LEVELS IN dBA



2. The same works for subtraction, i.e. if two equal noise sources are producing 63 dB and one is turned off or removed, then the remaining noise level is 60 dB.
3. If two (or more) noise sources are not equal then the addition or subtraction of one (or some) of the sources will not raise or lower the final level by 3 dB. The final level will depend more upon the loudest source still on. If one source is running, and a second, slightly quieter or somewhat quieter source is added, then the combined noise level will go up only by 2½ or 2 or maybe only 1 dB.
4. The practical limit of rule 3 above is when the sources differ by 10 dB in their noise levels. In this case, the louder source is said to dominate the noise environment and the quieter source can be ignored because it is contributing less than .4 dB to the overall combined noise level. A difference of .4 dB is considered very small. This rule 4 is also important when you are trying to reduce noise from multiple sources or noise coming in through multiple pathways. Always try to reduce the loudest source first - - - the quiet ones don't count!
5. "Small" noise leaks are very important. A 1% crack or gap in a noise enclosure, or building shell will reduce the noise control effectiveness by 90%. A substantial amount of expensive noise control effort may be wasted.

A nomograph (Figure III-2) follows this discussion. It may be used to help calculate combined noise levels.

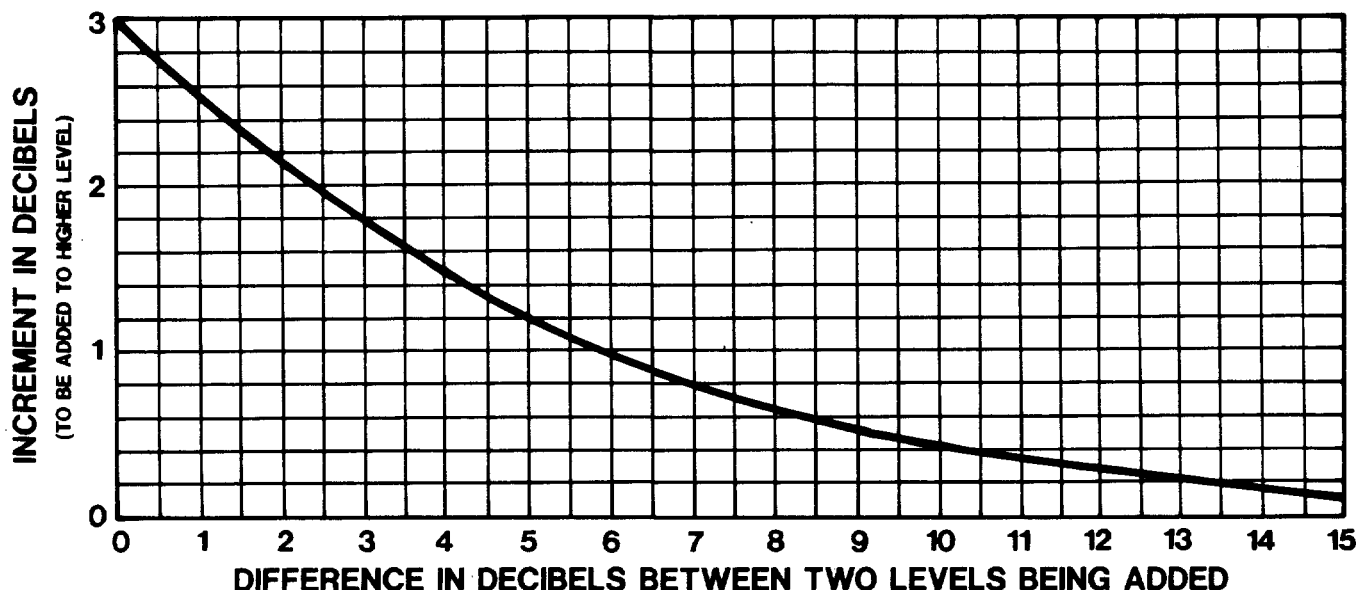
Combining Decibels

Very often situations occur in which there is more than one source of noise contributing to the total noise level at a particular location. For example, there may be noise from two roadways impacting a site, or perhaps a new noise source is being planned in an already noisy environment.

Because sound levels have logarithmic units known as the decibel, the sound levels cannot be added or subtracted algebraically. The procedure for combining two sound levels is to first convert the sound levels to squared pressures, then add or subtract the squared pressures as required by the situation, and then convert back to sound levels. For example, two sound levels of 70 decibels and 70 decibels yield a total sound level of 73 decibels, not 140 decibels.

For ease of adding sound levels, the chart on the following page may be used. An example of its use follows.

FIGURE III-2
DIFFERENCE IN DECIBELS BETWEEN TWO LEVELS BEING ADDED



EXAMPLE

Assume a house is impacted by an average sound level of 60 decibels from an adjacent roadway. A new roadway is planned and is estimated to generate an average sound level of 66 decibels at the same house. To combine the two sound levels, the following steps occur:

MATHEMATICALLY

1. Divide each value by 10
($60 \div 10 = 6.0$)
($66 \div 10 = 6.6$)
2. Take the antilog of each value.
(antilog 6.0 = 1,000,000)
(antilog 6.6 = 3,981,071)
3. Add the values together.
(1,000,000 + 3,981,017 = 4,981,017)
4. Take the logarithm of the resultant value.
($\log 4,981,017 = 6.697$)
5. Multiply by 10.
($6.697 \times 10 = 66.97$) The new average sound level at the house is 67 decibels.

USING THE CHART

1. Find the difference in the two sound levels.
($66 - 60 = 6$ decibels)
2. Enter the chart at 6 decibels on the horizontal axis.
3. Read up from the 6 decibels to the curved line and then horizontally to the left, to read an increment of 1 decibel from the vertical axis.
4. Add the 1 decibel increment to the higher of the two initial values ($66 + 1 = 67$ decibels).
5. The new average sound level at the house is 67 decibels.

Perception of Noise

So far, we have discussed physical noise quantities and the mathematical description of physical noise levels, changes in level, and combining noises. A brief discussion of some perception factors is equally as important to your understanding of noise as it affects people.

In general, for common sounds directly presented for comparison, a reasonable person of normal sensibilities will exhibit the following correspondence between physical noise quantity change and perceived change:

TABLE III-1
PERCEPTION OF NOISE * * *

<u>Change of</u>	<u>Perception</u>
Plus 1 dB	Slightly noticeable
Plus 2-3 dB	Somewhat louder
Plus 5 dB	Distinctly louder
Plus 8-9 dB	Twice as loud

Noise Descriptors

As previously discussed, one attribute of sound is *frequency* (the number of pressure changes above (+) and below (-) the static atmospheric pressure in a one second time interval expressed as Hertz, (abbreviated Hz). It is somewhat rare to have a "pure tone" or "simple tone" sound of predominately one frequency in the community environment. Environmental noise is generally comprised of numerous sounds containing many different frequencies all at once. Some noise may have more low frequencies and sound rumble or deep; some noise may contain more high frequencies and sound hissing. Even though a noise may contain low frequency noise and high frequency noise of equal amplitudes, the ear does not hear the low tones (or the very high tones) as well as the middle/high tones. That's why a baby's cry is more easily heard than a subway or very distant thunder. This becomes important when measuring noise with electronic instruments or trying to predict the effect that a particular noise will have on people. Most high quality sound measuring instruments can measure sounds of low or high frequency equally well; in this respect they are too good for a community noise measurement! Actually this high quality frequency response is very useful for other types of measurements such as predicting or measuring the noise reducing characteristics of sound barriers, which is briefly discussed below. For community noise measurement we do take into consideration the difference between the frequency response performance of the instrument and the average human hearing.

Sometimes you will see a capital A along with dB, as in dB(A) or dBA. This means that the electronic measuring instrument (or computer) has a modified response to sound. The frequency response has been "weighted" to more closely represent how our ears hear sounds of different pitch. By agreement, all community noise is considered to be "A-weighted", so the "A" is sometimes left off. Basically, A-weighting tends to ignore low frequency sound and puts more emphasis on sound in the speech frequency range.

Typical community noise results from many sources and varies so that the noise level is not usually constant. This changing noise level may be expressed in statistical terms or in terms

of its energy or power. Several rating descriptions have been developed for the measurement of community noise. The predominate rating descriptions in California are energy based and are called: Energy Mean Noise Level (L_{eq}); Day-Night Average Sound Level (L_{dn}); and Community Noise Equivalent Level (CNEL). These each use "dB" to indicate level. They are all A-weighted. The L_{dn} and CNEL descriptions apply different penalty factors to noise occurring during certain times of the evening and/or nighttime. L_{dn} adds a 10 dB penalty to noise occurring at night (10:00 p.m. to 7:00 a.m. of the next day); CNEL adds a 5 dB penalty to noise occurring during the evening (7:00 p.m. to 10:00 p.m.) and a 10 dB nighttime penalty between 10:00 p.m. and 7:00 a.m. Thus when a noise level is given in dB for a particular location, it is important to know what energy descriptor is associated with that value.

The CNEL index is used in the City of Carlsbad for several reasons including: It satisfies the State requirement that the acoustical scale include both magnitude of noise and frequency of occurrence; and it incorporates factors of amplitude and the pitch of noise, hearing sensitivity of the human ear, duration of noise, and time of day penalty factors. The CNEL index is also the method of airport noise description required by the State of California Aeronautics Division for Environmental Impact Reports. It is the current planning index used by Airport Land Use Commissions (SANDAG in San Diego County).

Noise Barriers

The manner in which a physical structure, like a noise barrier wall or earthen berm, interacts with a sound wave is very dependent upon the dimensions of the barrier, and the frequency of the sound wave. This is due to the physics of wave behavior. In simplified terms, there are three components of a soundwave/barrier interaction that are of interest:

1. Sound passing directly through the barrier (transmitted);
2. Sound bouncing back from hitting the barrier (reflected); and,
3. Sound bending over the top or around the ends of the barrier (diffracted).

The first component is the easiest to control and is a function of the "surface mass" or density of the wall; in order for a barrier to be normally effective the transmitted sound component should be 10 dB or more below the level of noise that is getting over or around the barrier. A minimum rule of thumb for highway noise barriers is 3.5 lbs per square foot, which is achieved by marine grade 3/4" plywood. This is why many materials can make effective barriers in addition to masonry block.

The second and third components are functions of the sound's frequency/wavelength and the barrier dimensions. The higher frequency sounds (i.e., shorter wavelength) more readily bounce back off the wall — the wall dimension, usually 8 to 16 feet high, is large compared to the dimension of the wavelength of the sounds. The lower frequency, longer wavelength sounds tend to partially overcome the barrier by bending over and around the barrier. This bending still causes the soundwave to lose some of its energy, therefore, we say that it has been attenuated by the barrier. If the sound has a very long wavelength dimension compared to the wall dimension then the wall has very little effect upon this low frequency soundwave which is not significantly attenuated.

As stated earlier, most environmental noise consists of many frequencies mixed together. Highway noise is no exception. Based upon measurement and analysis it was found that the most energy in highway noise is concentrated around 500–550 Hz, which corresponds to a wavelength of approximately 2 feet. Therefore, when designing barriers and predicting their expected noise attenuation performance, noise control engineers use a noise wavelength of 2 feet for calculations and computer modeling.

Noise Mapping

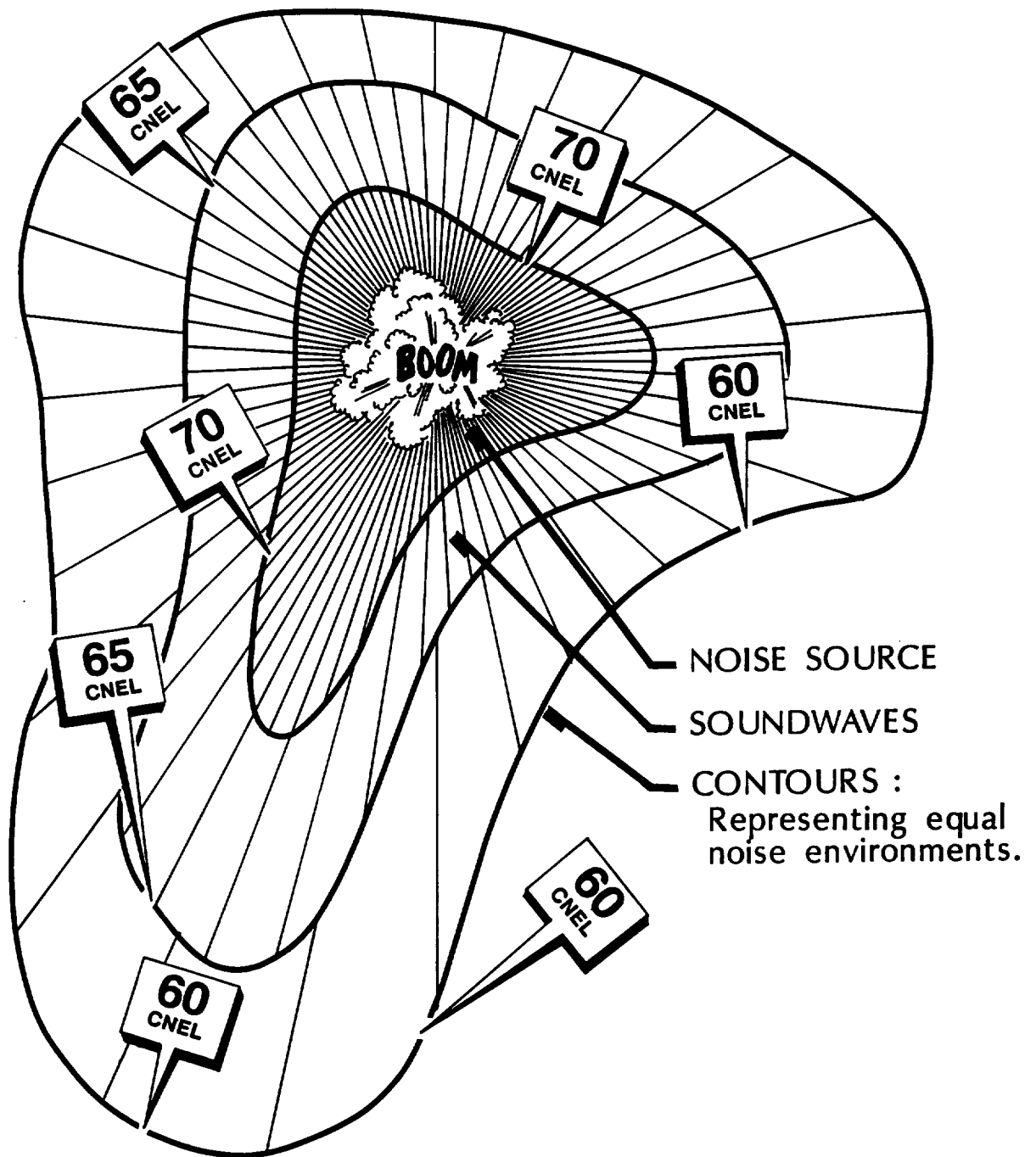
Noise mapping helps us to see where noise might conflict with existing or planned land-use. On a noise map, such as the Existing and Future Noise Exposure Maps that are part of the Noise Element, each noise line is called a "contour" line. The noise level is the same at any point on a given line, i.e., the 65 dB CNEL contour line indicates that the noise environment from a single source or combined sources is equivalent at any point on that contour line. The noise environment changes between contour lines and becomes noisier or more quiet as we get closer to a higher or lower value noise contour. As illustrated in Figure III-3 noise contours are spaced at 5 dB increments according to the requirement of state law.

For the planning and development process, the noise contour lines are determined as accurately as possible using the best engineering techniques, and then the contour lines are "fixed" in location and are used to implement the noise policy of the City. We call these fixed lines Policy Implementation Lines, and consider them to be similar to, and used like, zoning district boundaries, or parcel map boundaries, or property lines.

Community noise is important because it affects our quality of life. Workplace noise is generally beyond the scope of this Manual, and is regulated by state and federal agencies. However, the City is concerned about workplace noise and is supportive of regulations which are designed to promote good health and reduce hearing damage.

Although the noise levels that are associated with the workplace and hearing damage are substantially higher than common community noise levels, the noise levels experienced in the nonwork environment may still have harmful health effects. These noise levels are in the "community noise impact range," approximately 40 dBA to 85 dBA.

FIGURE III-3
NOISE CONTOURS



The noise environment has the same value
at any point on a single contour line.

Harmful Effects of Noise

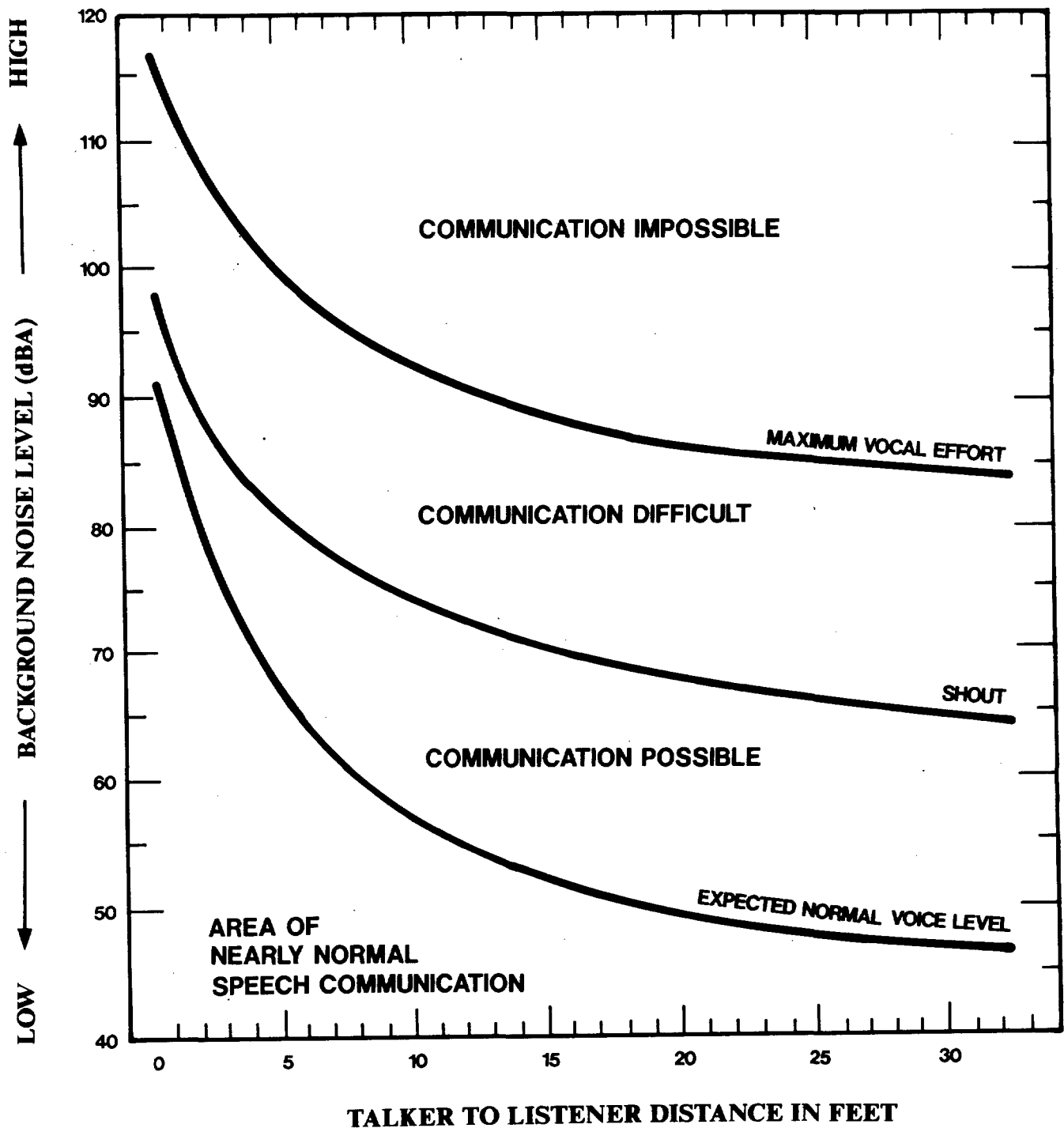
Noise in the Community Noise Impact Range (40 dBA to 85 dBA) can cause temporary physiological and/or psychological effects. If the noise/response cycle is repeated at a sufficiently close interval and continues over time, then the noise may contribute to and aggravate certain disorders such as headache, fatigue, digestive upsets, circulatory or equilibrium problems, etc. Noise is considered a "stressor" and may have serious implications in stress-related ailments.

Two areas of significant concern with respect to effects of community noise on people are the interference with speech communication, which includes not only person-to-person but telephone, radio, and television communication, and the interruption of sleep. Figure III-4 illustrates how speech and communication can be impacted by noise.

Excessive background noises can reduce the amount and quality of verbal exchange and thereby impact education, family lifestyles, occupational efficiency and the quality of recreation and leisure time. Speech interference begins to occur at about 40 to 45 decibels and becomes significant at about 60 decibels. Background noise levels affect performance and learning processes through distraction, reduced accuracy, increased fatigue, annoyance and irritability, and the inability to concentrate.

Several factors determine whether or not a particular noise event will interfere with or prevent sleep. These factors include the noise level and characteristics, the stage of sleep, the individual's age, motivation to waken, and so forth. Ill or elderly people are particularly susceptible to noise induced sleep interference.

FIGURE III-4
SPEECH COMMUNICATION AS A FUNCTION OF BACKGROUND NOISE LEVEL



Source: "Effects of Noise on People" Acoust. Soc. Am. 56, 724 (1974)



IV. PROJECT PROCESSING PROCEDURES

IV. PROJECT PROCESSING PROCEDURES

This section is intended to be primarily used by project applicants and citizens who are interested in understanding how noise issues are addressed during the City's review of a development proposal.

The purpose of this section is to identify how noise issues are handled in the City's review of development proposals. It is intended that this section provide the reader with the method used by City staff to evaluate noise issues of development projects. By understanding this process, it is intended that proposed projects will, by their planning and design, comply with the City's policies concerning noise/land-use compatibility.

This section should be used to determine whether a possible noise/land-use conflict would occur if action is not taken to resolve potential noise problems. It is expected that both citizens and City staff will refer to this section when evaluating development proposals.

Although noise issues are considered important, it is only one of several planning issues that might be identified in a new project. Noise issues should be addressed through the routine project approval process.

A. Guidelines for Complying with City Noise Policies

The most satisfactory method of complying with City noise policies is through good project design. The design should recognize community noise as a concern and design-out potential noise conflicts. This section of the manual will provide guidance on ways to comply with City Noise Policies. The project designer is encouraged to integrate creative solutions to noise concerns, with the solutions of other site development concerns such as safety, provision and utilization of open space, viewshed enhancement, interior traffic circulation, recreation, etc.

The following is a discussion of methods of complying with City Policies. Table IV-2, at the end of this section, provides a summary of these suggestions.

1. **Residential Noise (R)**

The City of Carlsbad considers residential land uses particularly sensitive to noise intrusion because residents are expected to use their homes for rest and recreation. Higher levels of noise interfere with such use. As such, the City has adopted specific noise standards to limit noise impacts to residential areas. There are a variety of ways to comply with City standards including the use of creative design alternatives. When noise is an issue on a project the applicant will be required to comply with the following to ensure compliance with City policies:

- R.1 All residential lots and dwellings are to be sound attenuated against present and projected roadway noise, which shall be the sum of all noise impacting the project, so as not to exceed an exterior standard of 60 dB(A) CNEL (see Noise Measurement Location in the Definitions Section for the description of Noise Measurement Location) in outdoor living areas and an interior standard of 45 dB(A) CNEL in all habitable rooms. Evidence prepared under the supervision of a certified acoustical consultant, that these standards will be satisfied in a manner consistent with applicable zoning regulations to be submitted as follows, (see Section VI, Noise Study and Report for Specific Submittal Requirements):

- a. Submit a Noise Report to the City for approval. The document should describe, in detail, the exterior noise environment and preliminary mitigation measures. Acoustical design features to achieve interior noise standards may be included in the document.
- b. Submit for City approval a Noise Study and Report describing the acoustical design features of the structures required to satisfy the exterior and interior noise standards. Additionally, submit satisfactory evidence indicating that the sound attenuation measures specified in the approved noise report(s) have been incorporated into the design of the project.
- c. Field testing in accordance with Title 24 regulations may be required by the City to verify compliance with STC and IIC design standards.
- d. For residential projects near existing or future transportation corridors, the owner shall be required, prior to recordation of the first final tract/parcel map or issuance of building permits, whichever is first, to prepare and record a notice that the property may be subject to impacts from the proposed or existing transportation corridor in a manner meeting the approval of the Planning Director and City Attorney (see Noise Form #1 of Technical Appendix I Forms).

2. Non-Residential Noise (NR)

- NR.1 All non-residential structures are to be sound-attenuated against the combined impact of all present and projected noise from exterior noise sources to meet the interior noise criteria as shown in Table IV-1.

Evidence prepared under the supervision of a certified acoustical consultant that these standards will be satisfied in a manner consistent with applicable zoning and building regulations shall be prepared under the supervision of a certified acoustical consultant and shall be submitted in the form of a Noise Report. This material shall describe, in detail, the exterior noise environment, and the acoustical design features required to achieve interior noise standards. Evidence shall also be provided which indicates that the specified sound attenuation measures have been incorporated into the design of the project (see Section VI Noise Study and Report for Specific Submittal Requirements).

TABLE IV-1
GUIDELINES FOR NON-RESIDENTIAL INTERIOR NOISE LEVELS

<u>TYPICAL USE</u>	<u>Leq (h) dBA</u>
Church Sanctuary, Preschool, Schools Fire Station Sleeping Quarters, etc.	45
General Office, General Commercial, Heavy Commercial, etc.	55
Planned Industrial, General Industrial	65

3. Property Impacted by Airport Generated Noise (A)

When a residential project requiring a discretionary action by the City is proposed within the 65 dB CNEL noise contour from the McClellan-Palomar Airport, the City will require the dedication of an Avigation Easement and the recordation of a Notice Concerning Aircraft Environmental Impacts. If a residential project is located within the 60 CNEL contour from the McClellan-Palomar airport, the City will require the posting of Aircraft Noise Impact Area signs in all sales offices associated with that development and require the recordation of a Notice Concerning Aircraft Environmental Impacts. Information related to compliance with these requirements is presented below.

- A.1 Prior to the recordation of the first final tract/parcel map or issuance of residential building permits, whichever is first, the owner of record of property located within 3 miles of McClellan Palomar Airport (see Technical Appendix E McClellan Palomar Airport for Airport Influence Area) may be required to prepare and record a notice (see Noise Form #3 in Technical Appendix I Forms) in a manner meeting the approval of the City Attorney and Planning Director that this property is subject to overflight, sight, and sound of aircraft operating from the McClellan Palomar Airport.
- A.2 An applicant may be required to produce evidence acceptable to the City that information, stating the property is subject to the overflight, sight, and sound of aircraft operating from the McClellan Palomar Airport, has been provided to the Department of Real Estate of the State of California for inclusion into the Final Subdivision Public Report.
- A.3 Prior to the recordation of the first final tract/parcel map, an avigation easement over the residential property located within the 65 dB(A) CNEL Noise Contour of McClellan-Palomar Airport may be required by the City, for dedication to the City (see Noise Form #2 of Technical Appendix I Forms).
- A.4 The applicant may be required to post aircraft noise impact notification signs in all sales offices associated with new residential development located within the airport 60 dB(A) CNEL contour. The number and location of said signs would be as approved by the City. (see Technical Appendix I Forms for details on Aircraft Noise Notification Signs)
- A.5 Prior to sale, lease, or rental of any structure or portion thereof, the applicant/owner may be required to provide to each prospective purchaser, lessees, or tenant a notice and statement of acknowledgement that the property is subject to overflight, sight, and sound of aircraft operating from McClellan Palomar Airport. The form and method of distribution of said notice and statement of acknowledgement would be as approved by the City.

4. Noise Generating Uses (NG)

The generation of noise for certain types of land uses could cause potential land use incompatibility. Noise generating uses or devices should be considered during normal project review. The following requirements should ensure that noise generated from specific land uses or devices will be compatible with adjacent land uses (see Section VI Noise Report for details).

- NG.1 Prior to approval of any permits, an Acoustical Analysis Report and appropriate plans shall be submitted describing the noise generation potential of the proposed project, and proposed noise attenuation measures to assure that an environment which is free from excessive or harmful noise is achieved and maintained. The report shall be prepared

under the supervision of a certified acoustical consultant and submitted to the Planning Director for review and approval. The approved attenuation features shall be incorporated into the plans and specifications of the proposed project.

- NG.2 Prior to approval of the proposed project or issuance of any permit, a Noise Report shall be submitted to the City, which illustrates the feasibility of the exterior mitigation measures required to achieve City Noise Standards.

5. Construction Noise (C)

Noise generated from construction activities is regulated by Carlsbad Municipal Code Section 8.48. When potential noise impacts from construction activities have been identified, conditions may be applied to a project to minimize those impacts. The following are examples of such conditions:

- C.1 Prior to project approval, the project proponent may be required to produce evidence acceptable to the City that:
- a. All construction vehicles or equipment, fixed or mobile, operated within 1,000 feet of a dwelling or noise sensitive use shall be equipped with properly operating and maintained mufflers.
 - b. Stockpiling and/or vehicle staging areas shall be located as far as practicable from dwellings and other noise sensitive receptors.

TABLE IV-2
SUMMARY OF SUGGESTED METHODS OF COMPLYING WITH CITY NOISE POLICIES

ITEM NUMBER	TYPE OF DEVELOPMENT	NOISE CONDITION	SUGGESTED ACTION
R.1	Residential (including residential portions of hotels, motels, hospitals, caretakers homes, condominium conversions, etc.)	Located within or 500' beyond the 60 dB(A) CNEL noise contour line of the City's Noise Contour Maps	Provide detailed noise report as specified by the City
NR.1	Non-Residential (offices, churches, preschools, restaurants, manufacturing, etc.)	Located within 60 dB CNEL of any source	Provide detailed noise report as specified by the City
A.1	Residential or Non-Residential	Within 3 mile radius of airport per CLUP	Record Notice of Airport Activity as specified by the City
A.2	Residential	Within 65 dB CNEL of the airport	Provide information regarding air activity in final Subdivision Noise Report
A.3	Residential	Within 65 dB CNEL of the airport	Record an Avigation Easement dedicated to and as specified by the City
A.4	Residential	Within 60 dB CNEL of the airport	Post "Aircraft Noise Impact Area" signs in Sales Office
A.5	Residential or Non-Residential	Within 60 dB CNEL of the airport	Provide <u>Statement of Acknowledgement</u> , to lessee, tenant, purchaser, etc., that property is subject to overflight, sight and sound of aircraft
NG.1	Non-Residential (car wash, pump station, sewage plants, dog kennels)	Project may generate noise in excess of City standards	Provide detailed noise report as specified by the City
NG.2	Residential or Non-Residential	Located near a major noise source and severity of exterior mitigation is of concern	Prior to project approval, provide detailed noise report as specified by the City to illustrate feasibility of mitigation measures required to meet the City noise standards
C.1	Residential or Non-Residential	Construction to occur near a noise sensitive land-use	Provide appropriate noise-attenuating devices (such as mufflers) on all construction vehicles or equipment located within 1,000 feet of noise sensitive land use

B. Procedure Used by the City to Evaluate Potential Noise Impacts

The process used by the City of Carlsbad for evaluating potential noise impacts of a project is discussed below and outlined as a flow chart on Figure IV-2 Development Review Process for Noise Evaluation:

Step 1:

Project is presented for City approval. Proceed to Step 2.

Step 2:

City staff evaluates the project for its noise sensitivity and/or noise generation potential by answering the following questions. Proceed to Step 3 upon answering these questions.

Will the proposed project:

	Yes	Maybe	No
Increase existing noise levels, by more than 3dB(A) CNEL?	_____	_____	_____
Expose people to noise levels above 85 dB(A), which are considered hazardous?	_____	_____	_____
Establish residential uses in areas within or 500-feet beyond the 60 dB(A) CNEL noise contour line of the Noise Contour Maps approved as part of the General Plan?	_____	_____	_____
Create a noise/land-use incompatibility pursuant to Figure IV-2 Land Use Compatibility for Community Noise Environments?	_____	_____	_____

Step 3:

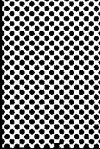
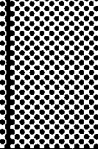








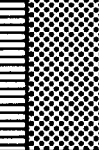

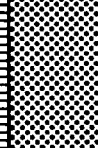
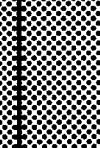
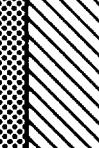




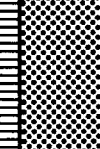
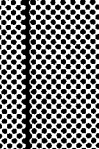

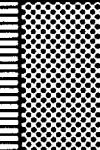
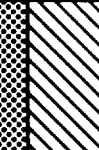


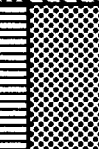


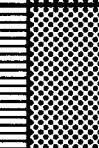



If you answered No to all four questions in Step 2, Land Use/Noise concerns are not an issue with your project. Proceed to Step 8. If you answered Yes to any of the questions in Step 2 proceed to Step 4.

Step 4:

Assess the noise problems or concerns which might affect the project. (See the Section that follows regarding additional project review considerations.) Address the following and proceed to Step 5.

What is the source of noise; is it ordinary or unusual for the area or designated land-use?

FIGURE IV-1
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS MATRIX

Land Use Category.	Community Noise Exposure CNEL, dB						
	55	60	65	70	75	80	
Residential - (all) Single Family, Duplex, Mobilehome, Multi-Family, etc.							<p>INTERPRETATION:</p> <div data-bbox="1166 527 1364 574"></div> <p>Normally Acceptable Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.</p> <div data-bbox="1166 812 1364 859"></div> <p>Conditionally Acceptable New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.</p> <div data-bbox="1166 1208 1364 1255"></div> <p>Normally Unacceptable New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.</p> <div data-bbox="1166 1553 1364 1600"></div> <p>Land Use Discouraged New construction or development should generally not be undertaken.</p> <p>NOTE: McClellan Palomar Airport Noise is regulated by the Airport Comprehensive Land Use Plan (CLUP). See the CLUP for airport noise compatibility guidelines.</p>
Transient Lodging - Motel, Hotel							
School, Library, Church, Hospital, Nursing Home							
Auditorium, Concert Hall, Amphitheater							
Sports Arena, Outdoor Spectator Sports							
Playground, Neighborhood Park							
Golf Course, Riding Stable, Water Recreation, Cemetery							
Office Building, Business Commercial Planned Industrial and Professional							
General Industrial, Manufacturing, Utilities, Agriculture							

How loud is the potential noise compared to the normal background noise?

Is the potential noise particularly identifiable, obnoxious, irritating, irregular or startling?

What or who is the potential receiver of the noise?

Is the potential receiver unusually sensitive?

Which use should be protected from encroachment in this particular circumstance?

Step 5:

Evaluate noise issues with respect to the Noise Element, Building Code, State Noise Insulation Standards, Airport's Comprehensive Land-Use Plan. The City will utilize the noise compatibility guidelines of Figure IV-1, Land Use Compatibility for Community Noise Environments, to determine the acceptability of noise levels impacting proposed projects. Upon completing this evaluation proceed to Step 6.

Step 6:

If after the City evaluates the proposed project and determines that potential noise impacts exist, and/or a potentially infeasible noise reduction methods are proposed, then the project is subject to the requirement of a Noise Study (see section VI for the submittal requirements of Noise Studies). If after analysis of Steps 4 and 5 it is determined that there are no potential significant noise impacts proceed to Step 8.

Step 7:

Upon completion of the Noise Study the project should be redesigned as necessary to conform with the recommendations of the study.

Step 8:

If it is determined that a project has no significant noise issues, then the project may proceed without need for Noise Study and Report; however, some application of noise Conditions of Approval may still be appropriate (i.e., to control construction noise, etc.).

B. Project Review Considerations

Potential noise impacts on noise-sensitive land uses, and the potential of noise impacts from noise-generating uses should be addressed on all proposed projects. The following is a discussion of these noise considerations.

1. Noise Sensitive Land Uses

Noise sensitive land uses can be either Residential or Non-Residential. The following is a description of noise sensitive uses which should be carefully reviewed during project processing for potential noise impacts.

Residential

Generally, the typical noise sensitive land uses to be analyzed would be those utilized for living or dwelling units. The following land uses are considered to be noise sensitive in the City of Carlsbad: Single family residential use or multi-family residential uses. These are the most prevalent noise sensitive land uses in the City. Residential uses may include a single house, duplex, condominium, townhome, apartment, and stock cooperative project. See Figure IV-1 for guidelines on noise levels generally considered acceptable for proposed land uses.

Other

Other noise sensitive land uses may include, but are not limited to: hotels, motels, hospitals, board and care facilities, convalescent facilities, nursing or rest homes, boarding schools, convents, churches, and emergency services living quarters.

2. Noise Generating Land-Uses, Devices and/or Activities

The following are examples of noise generators which may be associated with certain types of land use. These devices or activities should be considered during the normal project review process. The examples are for guidance only and are not the only potential noise generating devices or activities that may be associated with a project.

Residential Land Use

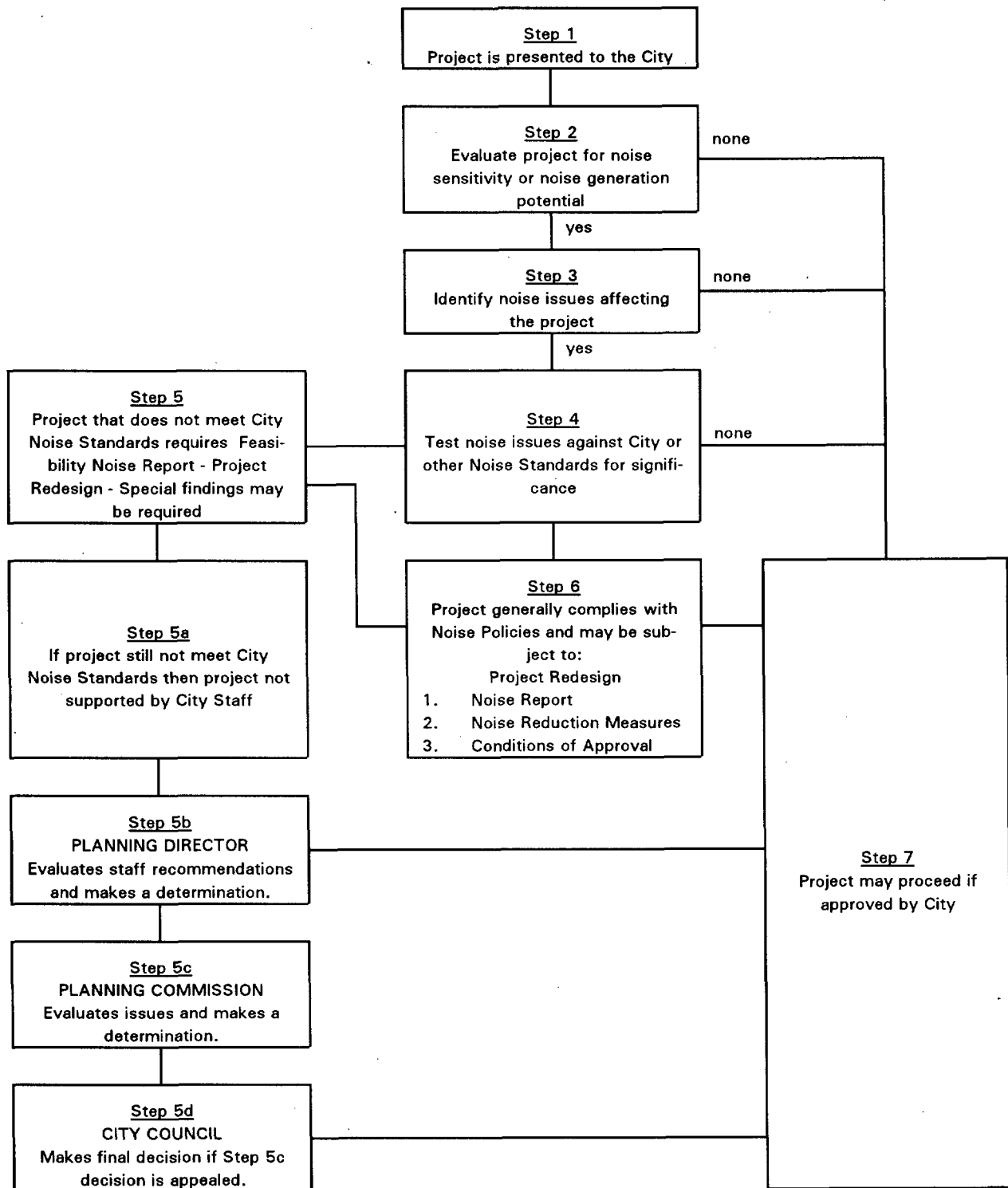
- Pool/spa pump
- Exhaust fan
- Air conditioner compressor, and/or evaporator fan
- Power mower/edger
- Leaf blower
- Power tools
- Trash pickup
- Community activity areas
- Internal vehicular circulation

Non-Residential Land Use:

- Car wash
- Fast food restaurant
- Auto dealership, service, repair
- Shopping center
- Street sweeping/parking lot sweeping
- Agriculture equipment
- Educational institution
- Nightclub

- Public address or alarm systems
- Religious institutions
- Cooling tower
- Industrial processes
- Air scrubbers and pollution control devices
- Hotels - Motels
- Construction equipment
- Manufacturing
- Power tools (electric, pneumatic, internal combustion)
- Public utility facilities
- Lumber yard
- Animal shelters, kennels
- Railroad facilities
- Athletic fields - activities
- Active parks
- Amphitheater
- Stadium

**FIGURE IV-2
DEVELOPMENT REVIEW PROCESS FOR NOISE EVALUATION**





V. CITY PREFERRED METHODS OF MITIGATING NOISE

V. CITY PREFERRED METHODS OF MITIGATING NOISE

This section is intended to be primarily used by project designers, project applicants and citizens interested in knowing the methods of mitigating noise that are preferred in the City of Carlsbad.

The purpose of this section is to provide guidance to the project designer regarding acoustical designs preferred by the City. The intent of this section is to encourage project designs that reduce the generation of noise, reduce the effects of noise upon project visitors, workers, or residents, and upon the areas surrounding the project. This section is not meant to be used merely as a source of "cookbook solutions" to potential noise problems. Rather, it is meant to familiarize staff and the project designer with a range of acoustical problem-solving approaches to control noise.

The City strongly believes that project layout and design are the preferred noise reduction techniques. Where noise barriers are necessary, then natural barriers such as site topography or constructed earthen berms or the buildings themselves are preferable to noise walls.

The most effective method of noise control is *source* control, e.g., quieter cars, silent lawnmowers, etc. Source control for most community noise sources is, unfortunately, not usually practical. The other options are *path* or *receiver* controls, with the *path* being the most common method required by the City. Path modifications include good acoustical layout and site design, barriers, buildings, etc. Many techniques and methods are effective noise control features. A project will typically be more desirable and more livable when noise control is built-in rather than added-on. An innovative approach using a wide range of alternatives is desired.

Guidelines for Reducing Noise

The following are guidelines for reducing the impacts of noise on a proposed project.

1. Project Design

Project design should be the primary method used to mitigate noise on a project. Project design should stress the orientation of units away from the source of noise generation, limit window openings onto highway or railroad rights-of-way, and should take advantage of the natural topography of the site where feasible (see Figures V-1 and V-2 for examples). As a least desirable design option, a project may require construction of berms, and/or berm/wall combinations, and lastly, noise walls; however, exclusive use of walls for noise reduction should be minimized.

2. Natural Topography

By taking advantage of the natural slope and contours of a site, it is often possible to arrange buildings in a manner which will reduce and possibly eliminate excessive noise impacts. The following site techniques should be considered to reduce noise impacts (See Figure V-3):

- Increase the distance between noise source and receiver;

FIGURE V-1
NOISE SENSITIVE SITE DESIGNS

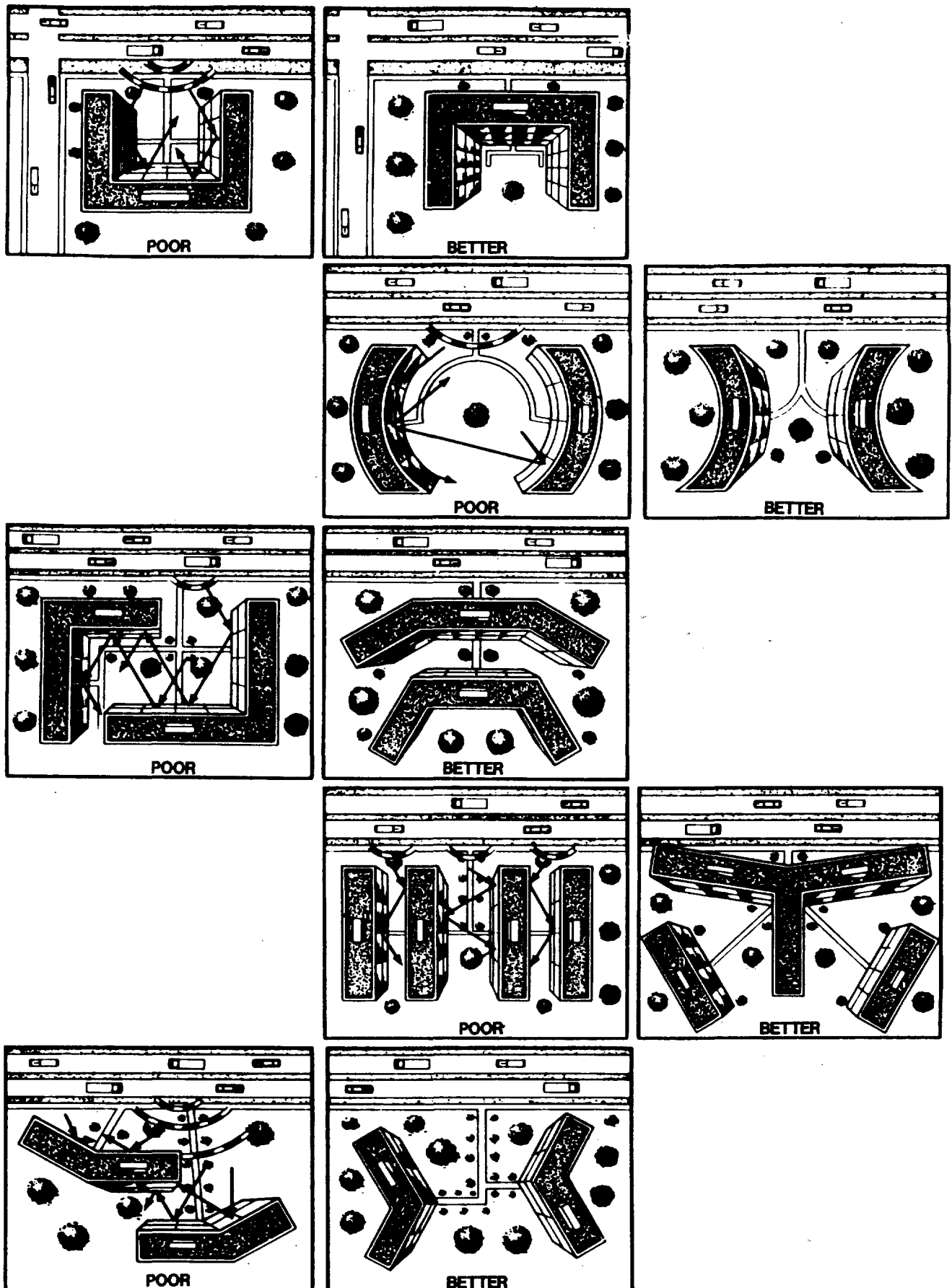
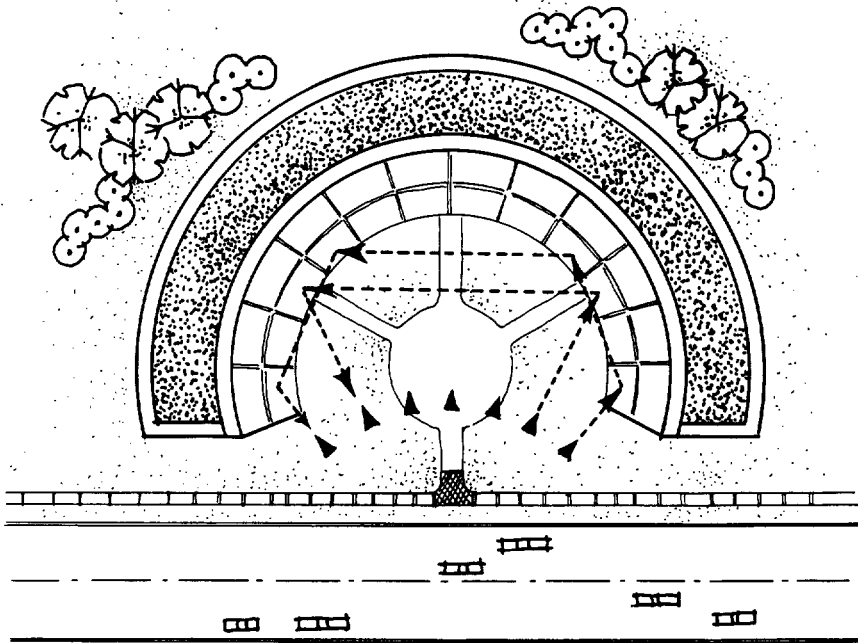
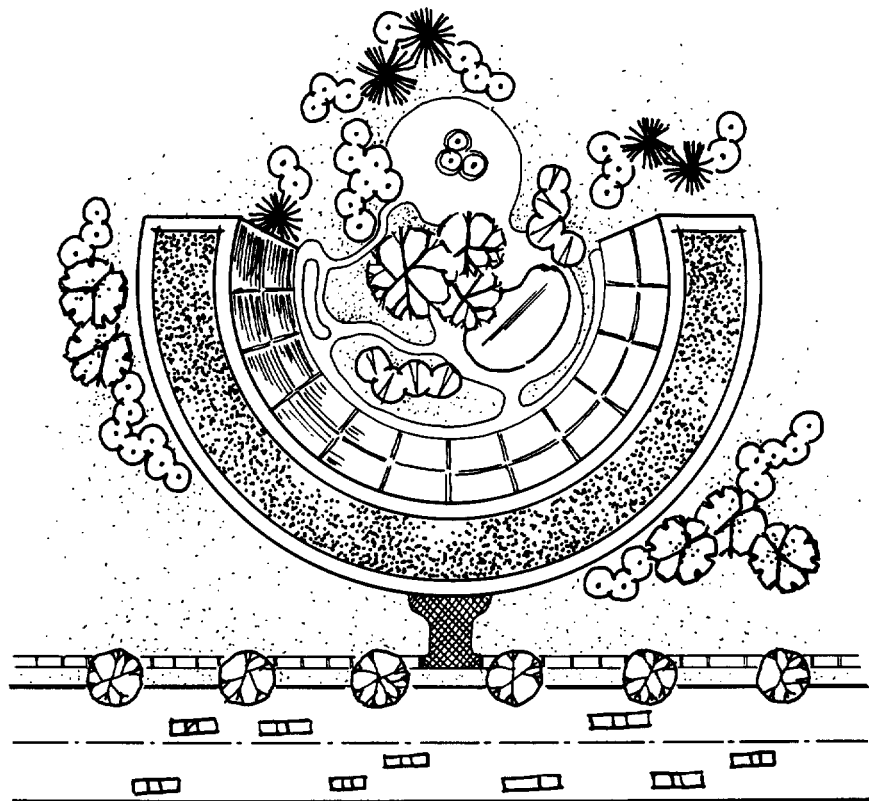


FIGURE V-2
NOISE SENSITIVE SITE DESIGN

POOR

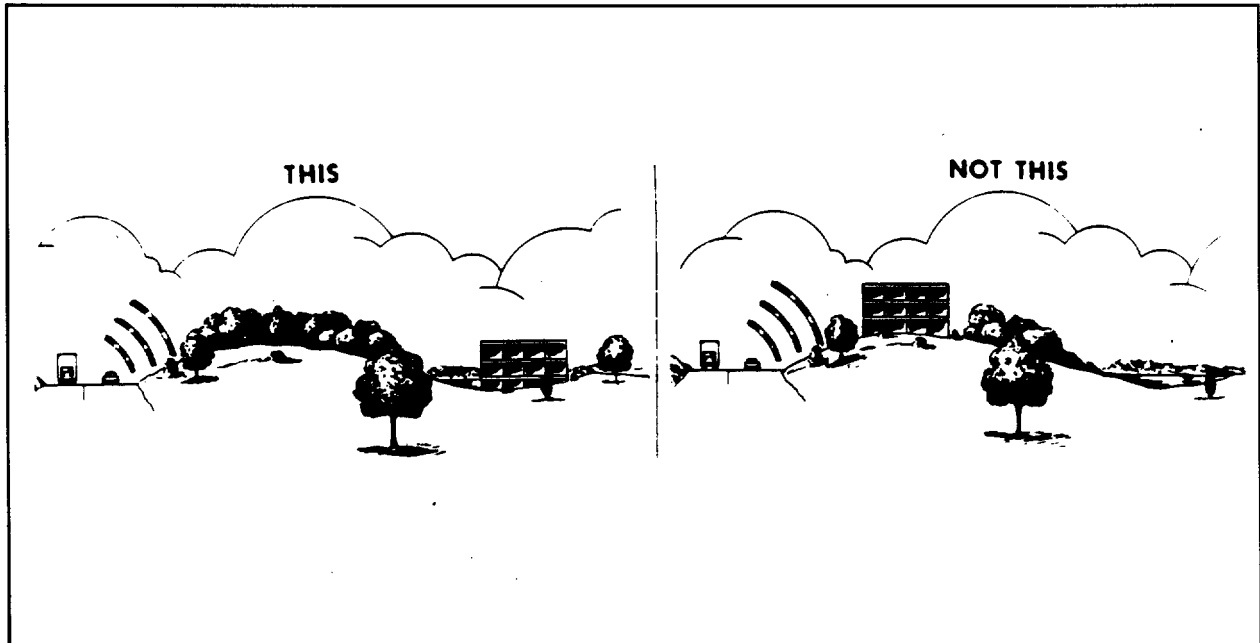


BETTER



- Place non-noise sensitive land uses such as parking lots, maintenance facilities and utility areas between noise source and receiver;
- Use non-noise sensitive structures such as garages to shield noise-sensitive areas; and
- Orient buildings to shield outdoor spaces from noise source(s) and to prevent echo build-up between buildings.

FIGURE V-3
NOISE MITIGATION THROUGH USE OF TOPOGRAPHY



3. Building Insulation

New buildings should be insulated to protect them from noise that could exceed interior standards.

4. Mechanical Ventilation

Air conditioning can be offered to allow windows to remain closed, even if it is not strictly required to meet noise standards. Be aware that the placement of mechanical ventilation devices should minimize noise impacts to surrounding noise sensitive uses.

5. Architectural Layout

Architectural layouts can be utilized as a means of meeting noise reduction requirements. The following steps should be considered during building design (see Figure V-4):

- Bedrooms should be placed on the side of the house facing away from a major road, rail line, runway, etc.
- Balconies facing major travel routes should be avoided.

- Quiet outdoor spaces can be provided even for a project located next to a noisy roadway by creating a U-shaped development which faces away from the roadway.

6. Noise Barriers

Noise barriers (topography, berms or walls) can reduce noise levels in outdoor areas and on the building's first floor from most ground-based sources. The City prefers the use of natural barriers such as earthen berms, to the use of screen walls. The following guidelines will ensure the effectiveness of a noise barrier:

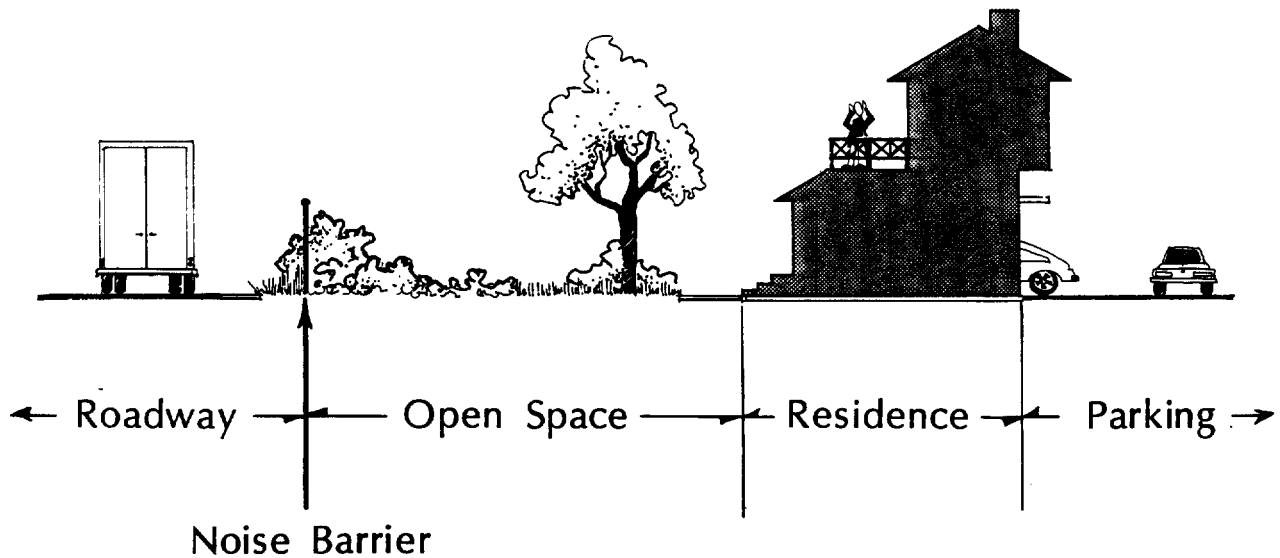
- The barrier should be dense enough to prevent significant noise transmission through it, high enough, and long enough to shield the receiver from direct line of sight to the noise source. Barrier design should be determined through a Noise Study.
- The typically acceptable minimum surface weight for a noise barrier is approximately 3½ to 4 pounds per square foot (equivalent to 3/4" plywood); however, specific calculations for a particular source and receiver situation may yield acceptable performance from less massive structures.
- The designer should consider undesirable visual impacts when specifying the materials used to construct the barrier. This is most important with wall type barriers; however, a constructed berm of landscaped earth is also likely to be more visually pleasing than a mound of gravel or a pile of rocks. It is possible, however, that the gravel or boulders might better fit a project's theme — use your imagination. Visually transparent barriers of glass or acrylic may be appropriate. Stucco finish, or textured precast concrete, various types of metal, aggregate finish, or heavy timber might be best for your particular site. The barrier should be carefully constructed so that there are no cracks, gaps, or openings.
- The barrier must interrupt the acoustical line-of-sight between noise source and receiver. Where heavy trucks contribute significantly to the noise environment, the noise study should include such noise influence in the analysis and mitigation recommendations.
- Narrow barriers, regardless of height, provide essentially no reduction in the overall noise level due to flanking effects of noise making an "end run" around the barrier.
- Noise control wall/berm heights should be measured from the interior base (observer side) of the wall/berm to the top of the wall/berm. (see Figure V-5)

Noise Reports frequently propose noise reduction measures necessary for the project to comply with City noise standards. When a project has an exterior noise level which requires reduction, a solution typically proposed is the construction of some type of noise attenuation barrier. Remember, however, that the barrier should take the form of a wall only if other approaches are shown to be infeasible, and then the wall construction material should not be limited to concrete block.

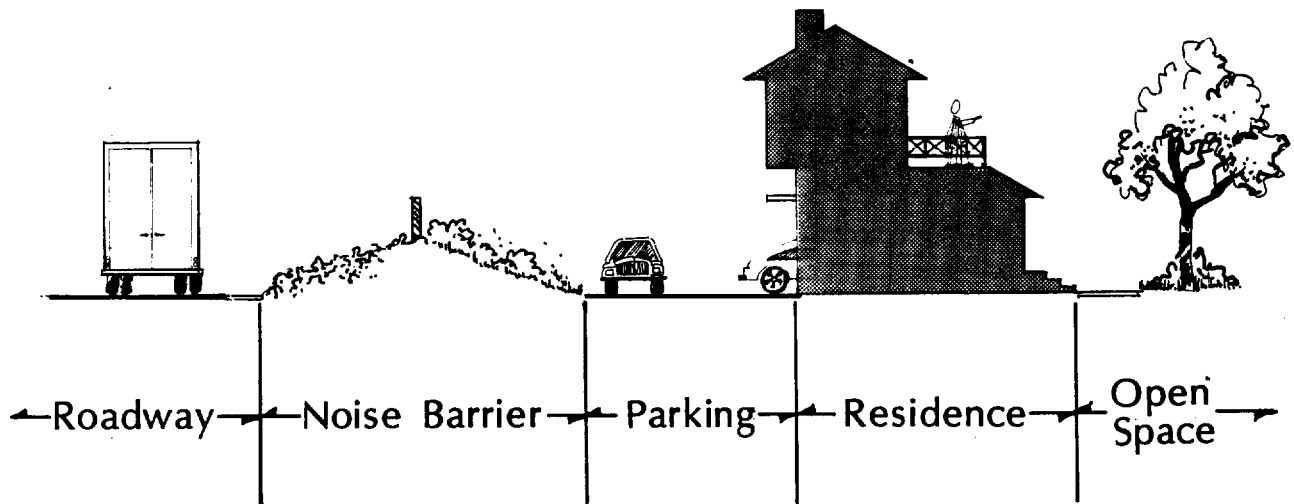
7. Treatment of Combined Uses

When a project description includes mixed land uses (such as a classroom and office space, or residential/non-residential uses, etc.) each area should be designed to meet the appropriate

FIGURE V-4
NOISE MITIGATION THROUGH ARCHITECTURAL LAYOUT

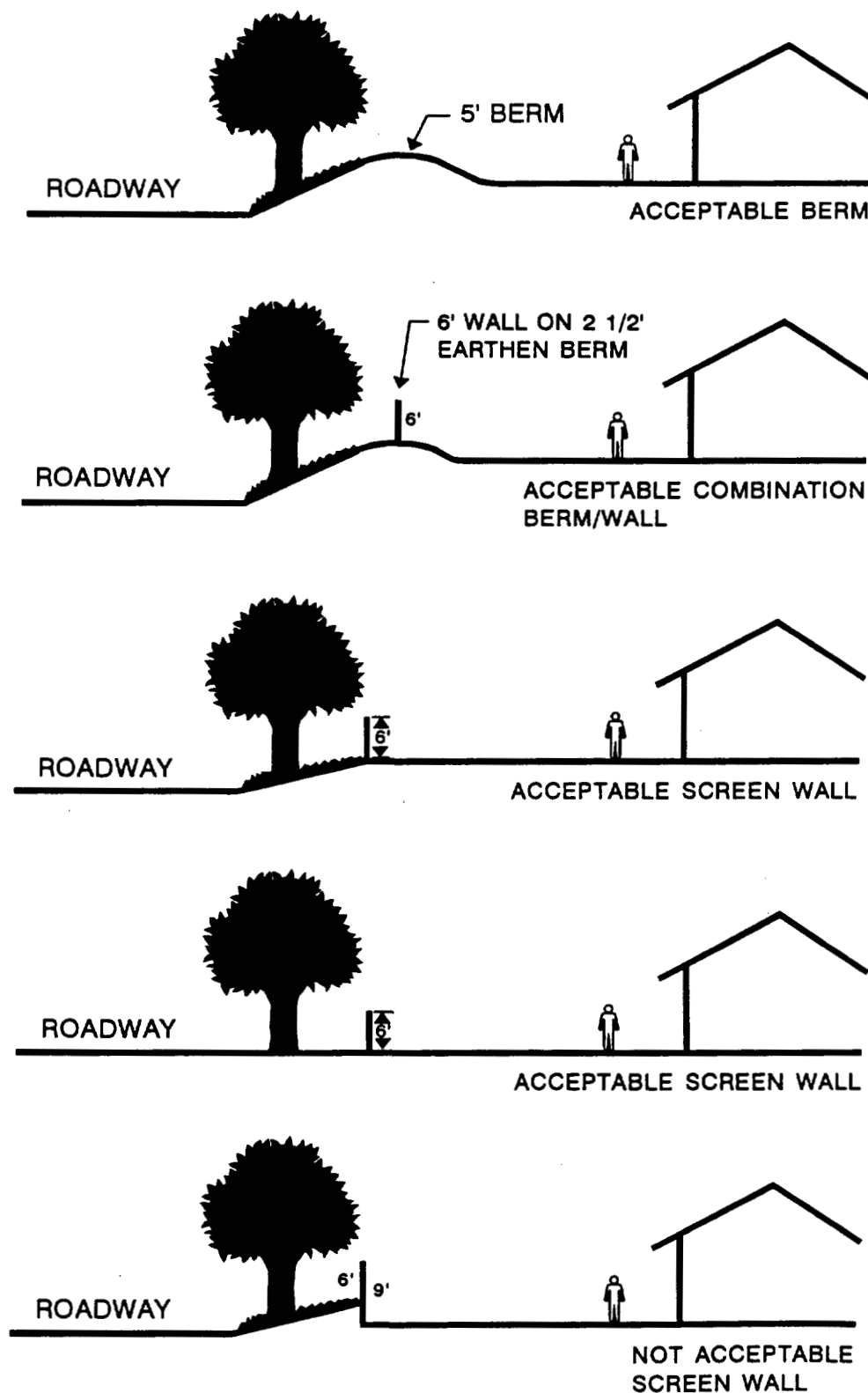


This design does not use the building for additional shielding from roadway noise.



This design uses the building as an additional noise barrier to shield outdoor areas.

FIGURE V-5
NOISE BARRIER ALTERNATIVES



NOTE: The height of the berm, screen wall, or combination of both shall be determined by the Noise Study

noise standard(s) as specified in the Noise Element of the General Plan. An example would be a hotel/motel. The habitable rooms (as defined by the Uniform Building Code) should be designed to meet an interior noise level of 45 dB CNEL or less, and the associated offices, kitchen area, and restaurant spaces should be designed to meet the appropriate L_{eq} standard. When the space usage is not yet determined, the worst case shall apply.

Variance Procedures

The project design team is strongly encouraged to utilize design features other than excessively tall structures to reduce noise.

An Administrative Variance granted by the Planning Director, is required to exceed wall heights permitted by zoning regulations. The Planning Director's decision may be appealed to the Planning Commission. The Planning Commission's decision may be appealed to the City Council.

By law a variance may be approved only if the findings listed below can be made:

1. There are exceptional or extraordinary circumstances or conditions applicable to the property or to the intended use that do not apply generally to the other property or class of use in the same vicinity and zone.
2. Such variance is necessary for the preservation and enjoyment of a substantial property right possessed by other property in the same vicinity and zone but which is denied to the property in question.
3. The granting of such variance will not be materially detrimental to the public welfare or injurious to the property or improvements in such vicinity and zone in which the property is located.
4. The granting of such variance will not adversely affect the Comprehensive Plan.

Compliance with Project Environmental Documentation

Environmental analysis during the planning stage of a project may result in project redesign or application of mitigation requirements for noise control. The applicant should indicate how acoustical mitigation measures will be incorporated into the project.



VI. NOISE REPORTS

VI. NOISE REPORTS

The Noise Reports Section is intended to be used primarily by noise consultants, project applicants and City staff in the preparation and review of a noise report required of a project.

The City may require the preparation of a Noise Report to be submitted for review and approval by the Planning Director. See Technical Appendix J Noise Report Application and Check List for detailed submittal requirements.

There are different types of noise studies and reports that may be prepared. The actual document submitted to the City will usually combine study methods and findings, along with any recommendations to comply with standards, into one package commonly called a "Noise Report." A typical community noise study may involve actual measurements of noise in the field, or modeling of the expected noise levels (often with a computer program), or a combination of both methods. The "report" portion will present and interpret the findings of the "study" and must describe the exterior noise environment in detail and, as necessary, propose measures to satisfy both exterior and interior noise level criteria that are applicable to the project. A project applicant must obtain the services of a certified acoustical consultant to perform the acoustical analysis in order to address compliance with City (and possibly State) Noise Standards. See Technical Appendix H for qualified consultant selection guidelines.

Types of Noise Reports

The three general categories of Noise Reports that the City might require are:

1. Feasibility Noise Report (for severe noise environments/impacts);
2. "One-Step" Complete Noise Report (when exact building design and location known); and
3. Phased Noise Report (for large conceptual projects).

1. Feasibility Noise Report

If a project is proposed to be located in a severe noise environment or if the project may generate excessive noise and the measures proposed to reduce noise levels to meet the City's noise standards may be impractical or undesirable, a Feasibility Noise Report may be required prior to accepting the project into the review process. The Feasibility Noise Report may be required in a number of situations, for example, where a residential development is proposed to be located close to railroad tracks, close to the airport, or immediately adjacent to the I-5 Freeway where high levels of noise are known to occur. The reason for asking for this type of report is to determine if feasible noise reduction methods exist which could potentially mitigate severe noise impacts without violating the zoning code, or by excessively restricting access or obscuring viewshed, etc. If it is technically impossible to satisfy noise standards, or if noise reduction features are impractical, or undesirable, then the City should know this early in the project evaluation process.

2. One-Step Complete Noise Report

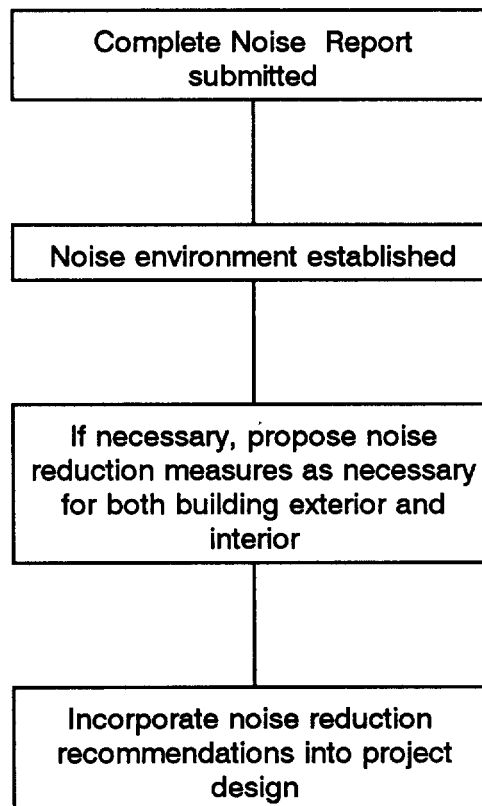
The "one-step" report system is designed for applicants who are applying for Grading Permits, Tentative Maps, or Building Permits and who have exact specifications as to the building design and location. The building information may be from architectural plans for a proposed development, or from an existing building as in the case of a condominium conversion.

A Noise Report will be submitted to the City for review which addresses, in detail, the exterior and interior noise levels. The report format must adhere to the City Noise Report Standards. All noise reduction measures recommended in the Noise Report shall be incorporated into the project, prior to project approval or issuance of any permits.

An applicant who knows the complete design of the project would utilize this method of Noise Report processing since it is the most cost-efficient and time-efficient way to obtain noise clearance as part of the normal project review process.

A flow chart which illustrates this method of compliance is shown below.

FIGURE VI-1
ONE STEP COMPLETE NOISE REPORT SUBMITTAL PROCESS



3. Phased Noise Reports

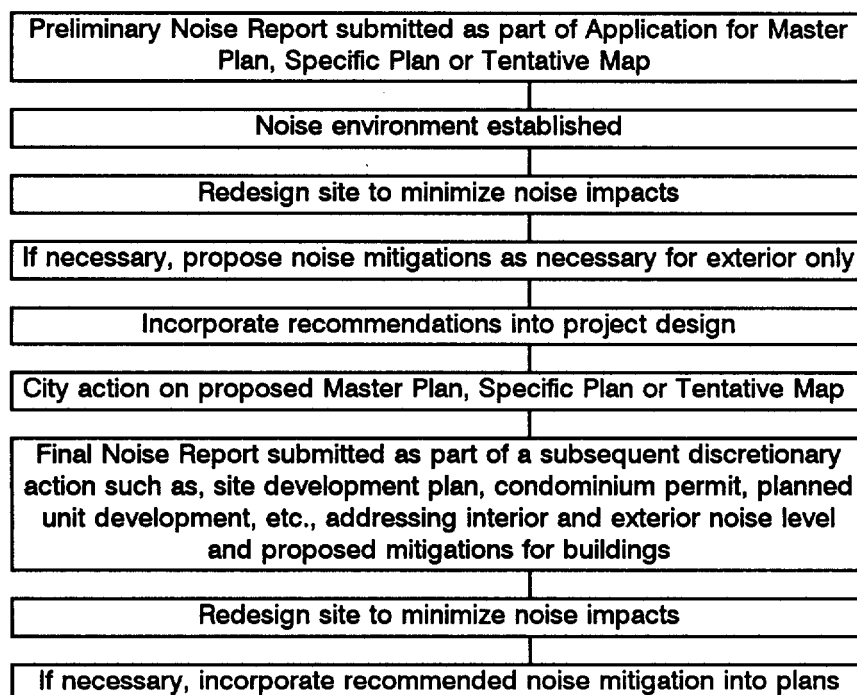
The Phased Noise Report method is designed for project applicants applying for the discretionary approval of a project such as a Master Plan, Specific Plan or Tentative Map submitted prior to knowledge of exact specifications of building design or location.

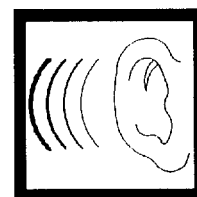
This method divides the complete noise report of the One Step Complete Noise Report Method into two parts: A Preliminary Noise Report and a Final Noise Report. A "Preliminary" Noise Report addresses the exterior noise levels expected on the project along with the approximate noise reduction measure that will likely be necessary to meet City standards. These preliminary noise reduction measures may then be evaluated for potential conflicts with zoning codes, etc., and steps recommended to eliminate the conflict. For example, altering pad grades with respect to a roadway grade may reduce noise barrier requirements. Again, this Preliminary Noise Report is appropriate where details of proposed structures are not yet determined.

When exact design and specifications for a project are submitted for review (i.e., Planned Unit Development, etc.), the Final Noise Report shall be submitted. The Final Noise Report will determine exterior noise levels in critical areas, final exterior noise reduction measures, and interior noise levels and noise reduction measures to achieve the interior standards. All noise reduction measures specified in the approved Preliminary and Final Noise Reports shall be incorporated into the project and shown on the building plans.

A flow chart which illustrates this method of compliance is shown below.

FIGURE VI-2
PHASED NOISE REPORT SUBMITTAL PROCESS





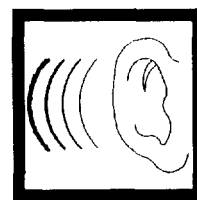
VII. CONDITIONS OF APPROVAL

VII. CONDITIONS OF APPROVAL

Generally, projects are not conditioned with special noise-reducing measures. Only provisions or actions which may not be logically satisfied during the project review process would ordinarily require the application of condition(s) of approval. For example, field testing of a completed residential unit for noise reduction compliance may be required prior to occupancy of units. Where a project already incorporates noise reducing design features as evidenced by statements, plans, drawings, and/or specifications submitted to the City during the project review process, generally it will not be necessary to apply specific noise control conditions of approval.

The following are examples of conditions which may be applied to a project impacted by noise:

- A. Prior to the issuance of any Certificates of Use and Occupancy, field testing in accordance with Title 24 regulations may be required by the City to verify compliance with STC and IIC design standards.
- B. Prior to issuance of any Permits, the project proponent shall produce evidence acceptable to the City that:
 - 1. All construction vehicles or equipment, fixed or mobile, operated within 1,000 feet of a dwelling shall be equipped with properly operating and maintained mufflers.
 - 2. Stockpiling and/or vehicle staging areas shall be located as far as feasible from dwellings and other noise sensitive receptors.



VIII. DEFINITIONS

VIII. DEFINITIONS

Acoustical Analysis Report: The formal document submitted to the City as part of the normal development review process or in satisfaction of a Condition of Approval, signed by a certified acoustical consultant. (Noise Reports Section VI)

Building Height: The height of a building shall be measured as follows:

1. "Building height" means the vertical distance of a structure measured from the more restrictive (lowest) of finished or existing grade. The vertical distance is measured from all points at grade along and within the building coverage to the highest point of the structure directly above that point of measurement.
2. "Existing grade", for the purposes of measuring building height, means the ground level elevation which existed on or before August 1, 1991 and prior to any grading or other site preparation related to, or to be incorporated into, a proposed new development or alteration of existing developments unless a discretionary permit for such developments or alterations is approve. In that case, existing grade shall mean the grade after the property is developed or improved in accordance with the grading plans which implement the approved discretionary permit. For nondiscretionary permits where the retaining walls, fill or other grading are utilized to create finished grade higher in elevation than existing grade as defined in this subsection and as determined by the planning director, then existing grade shall be used in the determination of building height.
3. Building height measurements include basements and other subterranean areas that are above existing grade. In the case of basements, cellars and underground parking, building height is measured from existing grade, excluding the area below existing grade.
4. Building height is measured to the peak of the structure. Per Carlsbad Municipal Code Section 21.46.020 of this title, penthouses or roof structures for the housing of elevators, stairways, tanks, ventilating fans or similar equipment required to operate and maintain the building; fire or parapet walls, skylights, architectural towers, flagpoles, chimneys, smokestacks, wireless masts and similar structures may be erected above the height limits prescribed in this title, but no penthouse or roof structure, or any other space above the height limit prescribed for the zone in which the building is located shall be allowed for the purpose of providing additional floor space, or be taller than required to accommodate the intended use. (CMC § 21.04.065)

Clear Zones: The Clear Zones for McClellan-Palomar Airport are the land areas adjacent to the ends of the runway's primary surface, over which aircraft using the airport must pass for each operation, either arrival or departure (CLUP, McClellan-Palomar Airport).

CLUP: Comprehensive Land Use Plan. A CLUP provides for the orderly growth for a public airport and the area surrounding the airport and which safeguards the general public welfare of the inhabitants within the vicinity of the airport and the public in general.

CNEL: Community Noise Equivalent Level. An index or metric of community noise. The metric used in California for quantifying aircraft and community noise levels, usually within 1 dB (higher) than L_{dn} for most common community noise sources. (See Noise Science Section III)

Day-Night Average Sound Level: See L_{dn}

dB: Common abbreviation for decibel, or 1/10 of a BEL.

dBA: A decibel quantity that has been A-weighted. The "weighting" compensates for the different hearing sensitivity of humans to different frequencies by discriminating against low and very high frequencies according to an approximate relationship to the hearing sensitivity of the human ear. All community noise sound level quantities are assumed to have been A-weighted unless stated otherwise. (See Noise Science Section III)

Decibel: A unit which denotes the ratio between two quantities which, with respect to sound, are proportional to sound power or sound pressure. When used with an associated numerical quantity, then the quantity is a "level" (e.g., Sound Pressure Level or SPL of 75 dB) with respect to the international reference quantity of sound (2×10^{-5} Newtons/Meter² which is the same as twenty micropascals). Two or more sound levels may be compared to each other using decibels so long as the reference level is identified (e.g., Sound Blue is 4 dB louder than Sound Yellow). A sound level change of 1 dB can just be detected by the human ear under normal conditions. (See Noise Science Section III)

Energy Mean Noise Level: See L_{eq}

Feasibility Noise Report: A preliminary report prepared by a certified acoustical consultant which broadly addresses noise issues that affect a project, highlighting areas of potential noise problems that might be difficult to solve. (See Noise Guidelines Section IV)

FIIC: Field Impact Insulation Class. An actual measure of Impact Isolation Class with allowance for reduced effectiveness due to various factors. (See IIC)

Flanking: The amount of the noise which goes around a barrier

FSTC: Field Sound Transmission Class. An actual measure of Sound Transmission Class with allowance for reduced effectiveness due to various factors. (See STC)

Hertz: (Hz) measurement unit of frequency or pitch. High frequency sounds (many Hz) are produced by rapidly vibrating objects and low frequency sounds (fewer Hz) by slowly vibrating objects. (See Noise Science Section III)

IIC: Impact Insulation Class. An indication of a floor/ceiling assembly's ability to attenuate the transmission of impact noise, generally from an upper story floor to a room below. (Refer to Chapter 35 of the Uniform Building Code)

L_{dn} : Day-Night average sound level. An index or metric of community noise. Developed by Environmental Protection Agency. Usually within 1 dB (lower) than CNEL for most common community noise sources. (See Noise Science Section III)

L_{eq} : Energy Mean Noise Level, also called equivalent level. An index or metric of community noise. (See Noise Science Section III)

Noise: Noise is unwanted sound.

Noise Measurement Location: Residential projects are to mitigate the projected build-out noise level to a maximum as described in Section II Noise Element Policies at:

1. 5-feet above finished grade level; and

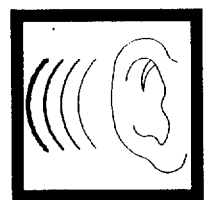
2. 20-feet from the rear/side of the structure, unless the rear/side yard is less than 20-feet deep where the measurement shall be taken at the property line. (Where the useable rear/side yard is less than 20-feet deep, the measurement may be taken at the back of the useable rear/side yard, as may be approved by the Planning Director.)

Where exterior space above the first floor/story of a residential structure is proposed to be used to meet Planned Development (PD) recreational space standards as required pursuant to Chapter 21.45 of the Carlsbad Municipal Code, the exterior space shall be mitigated to the City Standard in order to receive credit as recreational space.

Noise Report: A gathering of information and the technical analysis, evaluation and/or prediction of noise caused by, or affecting a project and a report of the findings and recommendations. (Noise Guidelines Manual Section VI)

Sound: Any pressure variation (in air, water or other medium) that the human ear can detect.

STC: Sound Transmission Class. An indication of the ability of a common wall between two units to attenuate sound originating in either unit from propagating into the other unit. (Refer to Chapter 35 of the Uniform Building Code)



IX. TECHNICAL APPENDIX

IX. TECHNICAL APPENDIX

Page

A. STATE NOISE REQUIREMENTS

1.	California Health and Safety Code	A-1
2.	California Code of Regulations, Title 24, Part 2 "Noise Insulation Standards" Summary	A-1
3.	California Code of Regulations Title 21 (Airport) "Noise Standards"	A-2
4.	California Noise Insulation Standards	A-3
5.	Sound Transmission Control (Ch. 35)	A-10

B. NOISE CONTOUR MAPS (REDUCED SIZE)

1.	Existing Noise Contours (1990)	B-1
2.	Future Noise Contours (2010)	B-2

C. VEHICULAR NOISE ASSESSMENT

1.	FHWA-RD-77-108	C-1
2.	Hard (Reflective) Sites - Soft (Absorbing) Sites	C-1
3.	Determination of "Hard" Site Versus "Soft" Site	C-2
4.	City of Carlsbad Traffic Mix	C-3
5.	Distances to Roadway CNEL Contours - Existing and Future . . .	C-6
6.	Distances to Roadway CNEL Contours - Future	C-8

D. RAIL NOISE ASSESSMENT

	Railroad Noise Assessment - Wyle Laboratories Report WCR 73-5 . . .	D-1
--	---	-----

E. McCLELLAN PALOMAR AIRPORT

1.	Airport Influence Area Map	E-1
2.	Palomar Airport Noise Control Plan	E-2

F. RELATIONSHIP OF NOISE ENERGY AND NOISE PERCEPTION TO DECIBEL SCALE

F-1

G. CONSTRUCTION EQUIPMENT NOISE LEVELS

G-1

H. PROFESSIONAL QUALIFICATIONS

	FOR ACOUSTICAL CONSULTANTS (City of Carlsbad)	H-1
--	---	-----

I. FORMS

1. Notice Concerning Proximity
of the Planned or Existing transportation corridor(s) I-1
2. Notice Concerning Aircraft Environmental Impacts I-4
4. Aircraft Noise Notification Signs I-7
3. Notice of Aircraft Noise Impact Area I-9

J. NOISE REPORT APPLICATION AND CHECKLIST

1. Noise Report Submittal Form J-1
2. Application Requirements for Noise Report Application J-2
3. Noise Report: Staff Review Checklist J-5

A. STATE NOISE REQUIREMENTS

A. STATE NOISE REQUIREMENTS

1. California Health and Safety Code

In order to preserve and protect the public health and safety of the residents of the State of California, the State Legislature enacted, and from time to time amends, certain laws, regulations and standards regarding noise. Some of these regulations affect the relationship of noise sources to residential dwellings and may also require certain acoustical performance of dwellings that are affected by community noise. The authority to develop these standards is in Section 17922.6 of the State Housing Law, Division 13, Part 1.5, as found in the State Health and Safety Code.

Section 18901, et seq., of the Health and Safety Code establishes the State Building Standards Law, and charges the Building Standards Commission with developing and publishing building standards and codes. The State Building Standards Code is Title 24 of the California Administrative Code, now called the California Code of Regulations.

2. California Code of Regulations Title 24, Part 2, "Noise Insulation Standards"

In compliance with the State law, the City of Carlsbad enforces Title 24, Part 2, "Noise Insulation Standards" and the Appendix Chapter 35 thereof, "Sound Transmission Control." These standards are summarized below and reproduced in full following this Section:

- a. An STC rating of 50 (laboratory) for party wall assemblies.
- b. An IIC rating of 50 (laboratory) for floor-ceiling assemblies.
- c. An STC rating of 26 for entrance doors (with perimeter seals) from interior corridors.
- d. 45 dB CNEL, or less, interior noise level for habitable rooms.
- e. Ventilation, and cooling if necessary, to provide a habitable interior environment when the interior noise level is met by requiring windows to be unopenable or closed.
- f. An Acoustical Analysis Report which illustrates compliance with the prescribed interior noise levels shall be prepared when the project is proposed within the 60 dB CNEL contour from any aircraft, vehicular, rail or industrial noise source.

The City's Noise Policy also applies to single family dwellings. This includes the provisions of Title 24, Part 2, "Noise Insulation Standards" as permitted by action taken pursuant to Section 17922.7 (b) and (c) of the Health and Safety Code.

3. California Code of Regulations Title 21 (Airport) "Noise Standards"

Noise standards governing the operation of aircraft and aircraft engines for all airports are described in California Code of Regulations Title 21, Division of Aeronautics, Subchapter 6 "Noise Standards". The regulations are designed to cause the airport proprietor, aircraft operator, local governments, pilots and Department of Aeronautics to work cooperatively to diminish noise. The regulations are achieved by controlling and reducing noise which affects communities in the vicinity of airports. Due to the length of Title 21 it has not been reprinted in this Manual.

**STATE BUILDING CODE
(Part 2, Title 24, CCR)**

**Appendix Chapter 35
SOUND TRANSMISSION CONTROL**

NOTE: See Matrix Adoption Appendix

Sound Transmission Control

Sec. 3501.

(a) General

- 1. Purpose and Scope.** The purpose of this section is to establish uniform minimum noise insulation performance standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than detached single-family dwellings from the effects of excessive noise, including but not limited to hearing loss or impairment and interference with speech and sleep.

These regulations shall apply to all applications for building permits made subsequent to August 22, 1974.

- 2. Definitions.** The following special definitions shall apply to this section:

Sound Transmission Class (STC) - A single number rating used to compare walls, floor-ceiling assemblies and doors for their sound insulating properties with respect to speech and small household appliance noise. The STC is derived from laboratory measurements of sound transmission loss across a series of 16 test bands. Laboratory STC ratings should be used to the greatest extent possible in determining that the design complies with this section.

Field Sound Transmission Class (FSTC) - A single number rating similar to STC, except that the transmission loss values used to derive the FSTC are measured in the field. All sound transmitted from the source room to the receiving room is assumed to be through the separating wall or floor-ceiling assembly. This section does not require determination of the FSTC, and field measured values of noise reduction should not be reported as transmission loss.

Impact Insulation Class (IIC) - A single number rating used to compare the effectiveness of floor-ceiling assemblies in providing reduction of impact generated sounds such as footsteps. The IIC is derived from laboratory measurements of impact sound pressure level

across a series of 16 test bands using a standardized tapping machine. Laboratory IIC ratings should be used to the greatest extent possible in determining that the design complies with this section.

Field Impact Insulation Class (FIIC) - A single number rating similar to the IIC except that the impact sound pressure levels are measured in the field.

Noise Isolation Class (NIC) - A single number rating derived from measured values of noise reduction between two enclosed spaces that are connected by one or more paths. The NIC is not adjusted or normalized to a standard reverberation time.

Normalized Noise Isolation Class (NNIC) - A single number rating similar to the NIC, except that the measured noise reduction values are normalized to a reverberation time of 1/2 second.

Normalized A-Weighted Sound Level Difference (D_n) - For a specified source room sound spectrum, D_n is the difference, in decibels, between the average sound levels produced in two rooms after adjustment to the expected acoustical conditions when the receiving room under test is normally furnished.

Day-Night Average Sound Level (L_{dn}) - The A-weighted equivalent continuous sound exposure level for a 24-hour period with a 10 dB adjustment added to sound levels occurring during nighttime hours (10 p.m. to 7 a.m.).

Community Noise Equivalent Level (CNEL) - A metric similar to the L_{dn} , except that a 5 dB adjustment is added to the equivalent continuous sound exposure level for evening hours (7 p.m. to 10 p.m.) in addition to the 10 dB nighttime adjustment used in the L_{dn} .

3. **Relevant Standards** - The current edition of the following standards are generally applicable for determining compliance with this section. Copies may be obtained from the American Society for Testing and Materials (ASTM) at 1916 Race Street, Philadelphia, Pa., 19103.

ASTM C 634 Standard Definitions of Terms Relating to Environmental Acoustics

ASTM E 90 Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

ASTM E 336 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings

ASTM E 413 Standard Classification for Determination of Sound Transmission Class

ASTM E 492 Standard Method of Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E 497 Standard Recommended Practice for Installation of Fixed Partitions of Light Frame Type for the Purpose of Conserving Their Sound Insulation Efficiency

ASTM E 597 Recommended Practice for Determining A Single-Number Rating of Airborne Sound Isolation in Multiunit Building Specifications

ASTM E 966 Standard Guide for Field Measurement of Airborne Sound Insulation of Building Facades and Facade Elements

ASTM E 989 Standard Classification for Determination of Impact Insulation Class (IIC)

ASTM E 1007 Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures

ASTM E 1014 Standard Guide for Measurement of Outdoor A-Weighted Sound Levels

4. **Complaints** - Where a complaint as to noncompliance with this article requires a field test, the complainant shall post a bond or adequate funds in escrow for the cost of said testing. Such costs shall be chargeable to the complainant if the field tests show compliance with these regulations. If the tests show noncompliance, then testing costs shall be borne by the owner or builder.
 5. **Local Modification** - The governing body of any city or county may, by ordinance, adopt changes or modifications to the requirements of this section as set forth in section 17922.7 of the Health and Safety Code.
- (b) **Interdwelling Sound Transmission Control**
1. **Wall and Floor-Ceiling Assemblies.** Wall and floor-ceiling assemblies separating dwelling units or guest rooms from each other and from public or service areas such as interior corridors, garages and mechanical spaces shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies.
EXCEPTION: Impact sound insulation is not required for floor-ceiling assemblies over non-habitable rooms or spaces not designed to be occupied, such as garages, mechanical rooms or storage areas.
 2. **Airborne Sound Insulation.** All such acoustically rated separating

wall and floor-ceiling assemblies shall provide airborne sound insulation equal to that required to meet a Sound Transmission Class (STC) rating of 50 based on laboratory tests as defined in ASTM Standards E 90 and E 413. Field tested assemblies shall meet a Noise Isolation Class (NIC) rating of 45 for occupied units and a Normalized Noise Isolation Class (NNIC) rating of 45 for unoccupied units as defined in ASTM Standards E 336 and E 413.

ASTM Standard E 597 may be used as a simplified procedure for field tests of the airborne sound isolation between rooms in unoccupied buildings. In such tests the minimum value of D_n is 45 dB for compliance.

Entrance doors from interior corridors together with their perimeter seals shall have Sound Transmission Class (STC) ratings not less than 26. Such tested doors shall operate normally with commercially available seals. Solid core wood slab doors 1 3/8 inch thick minimum or 18 gauge insulated steel slab doors with compression seals all around, including the threshold, may be considered adequate without other substantiating information.

Field tests of corridor walls should not include segments with doors. If such tests are impractical, however, the NIC or NNIC rating for the composite wall-door assembly shall not be less than 30.

Penetrations or openings in construction assemblies for piping, electrical devices, recessed cabinets, bathtubs, soffits, or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.

- 3. Impact Sound Insulation.** All acoustically rated separating floor-ceiling assemblies shall provide impact sound insulation equal to that required to meet an Impact Insulation Class (IIC) rating of 50 based on laboratory tests as defined in ASTM Standards E 492 and E 989. Field tested assemblies shall meet a Field Impact Insulation Class (FIIC) rating of 45 for both occupied and unoccupied units as defined in ASTM Standards E 1007 and E 989, with the exception that the measured impact sound pressure levels shall not be normalized to a standard amount of absorption in the receiving room.

Floor coverings may be included in the assembly to obtain the required ratings. These coverings must be retained as a permanent part of the assembly and may be replaced only by other floor coverings that provide the required impact sound insulation.

4. Tested Assemblies.

- A. Laboratory tested wall or floor-ceiling designs having STC or IIC ratings of 50 or more may be used by the building official to determine compliance with this section during the plan review phase. Field tests shall be required by the building official when evidence of sound leaks**

or flanking paths is noted, or when the separating assembly is not built according to the approved design.

- B. Generic sound transmission control systems as listed in the *Catalog of STC and IIC Ratings for Wall and Floor-Ceiling Assemblies*, as published by the Office of Noise Control, California Department of Health Services, or the *Fire Resistance Design Manual*, as published by the Gypsum Association, may be used to evaluate construction assemblies for their sound transmission properties. Other tests from recognized laboratories may also be used. When ratings for essentially similar assemblies differ, and when ratings are below STC or IIC 50, field testing may be used to demonstrate that the building complies with this section.
- C. For field testing, rooms should ideally be large and reverberant for reliable measurements to be made in all test bands. This is often not possible for bathrooms, kitchens, hallways or rooms with large amounts of sound absorptive material. Field tests results should, however, report the measured values in all bands, noting those which do not meet relevant ASTM criteria for diffusion.
- D. It should be noted that STC ratings do not adequately characterize the sound insulation of construction assemblies when the intruding noise is predominantly low pitched, as is often produced by amplified music or by large pieces of mechanical equipment.

It should also be noted that the transmission of impact sound from a standardized tapping machine may vary considerably for a given design due to differences in specimen size, flanking transmission through associated structure and the acoustical response of the room below. Laboratory IIC values should therefore be used with caution when estimating the performance of hard surfaced floors in the field. Additionally, IIC ratings may not always be adequate to characterize the subjectively annoying creak or boom generated by footfalls on a limber floor.

- 5. **Certification.** Field testing, when required, shall be done under the supervision of a person experienced in the field of acoustical testing and engineering and who shall forward test results to the building official showing that the sound isolation requirements stated above have been met. Documentation of field test results should generally follow the requirements outlined in relevant ASTM standards.

(c) Exterior Sound Transmission Control

- 1. **Application.** Consistent with local land use standards, residential structures located in noise critical areas, such as proximity to highways, county roads, city streets, railroads, rapid transit lines, airports, or industrial areas shall be designed to prevent the intrusion of exterior noises beyond prescribed levels. Proper design shall include, but shall

not be limited to, orientation of the residential structure, setbacks, shielding, and sound insulation of the building itself.

2. **Allowable Interior Noise Levels.** Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either the Day-night Average Sound Level (L_{dn}) or the Community Noise Equivalent Level (CNEL), consistent with the noise element of the local general plan.

NOTE: L_{dn} is the preferred metric for implementing these standards.

Worst case noise levels, either existing or future, shall be used as the basis for determining compliance with this section. Future noise levels shall be predicted for a period of at least ten years from the time of building permit application.

3. **Airport Noise Sources.** Residential structures to be located where the annual L_{dn} or CNEL (as defined in Title 21, Subchapter 6, CCR) exceeds 60 dB shall require an acoustical analysis showing that the proposed design will achieve the prescribed allowable interior level. For public use airports or heliports, the L_{dn} or CNEL shall be determined from the airport land use plan prepared by the county wherein the airport is located. For military bases, the L_{dn} shall be determined from the facility Air Installation Compatible Use Zone (AICUZ) plan. For all other airports or heliports, or public use airports or heliports for which a land use plan has not been developed, the L_{dn} or CNEL shall be determined from the noise element of the general plan of the local jurisdiction.

When aircraft noise is not the only significant source, noise levels from all sources shall be added to determine the composite site noise level.

4. **Other Noise Sources.** Residential structures to be located where the L_{dn} or CNEL exceeds 60 dB shall require an acoustical analysis showing that the proposed design will limit exterior noise to the prescribed allowable interior level. The noise element of the local general plan shall be used to the greatest extent possible to identify sites with noise levels potentially greater than 60 dB.

5. **Compliance.** Evidence of compliance shall consist of submittal of an acoustical analysis report, prepared under the supervision of a person experienced in the field of acoustical engineering, with the application for a building permit. The report shall show topographical relationships of noise sources and dwelling sites, identification of noise sources and their characteristics, predicted noise spectra and levels at the exterior of the proposed dwelling structure considering present and future land usage, basis for the prediction (measured or obtained from published data), noise attenuation measures to be applied, and an analysis of the noise insulation effectiveness of the proposed construction showing that the prescribed interior noise level requirements are met.

If interior allowable noise levels are met by requiring that windows be unopenable or closed, the design for the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling unit or guest room noise reduction.

- 6. Field Testing.** When inspection indicates that the construction is not in accordance with the approved design, or that the noise reduction is compromised due to sound leaks or flanking paths, field testing may be required. A test report showing compliance or noncompliance with prescribed interior allowable levels shall be submitted to the building official.

Measurements of outdoor sound levels shall generally follow the guidelines in ASTM E 1014.

Field measurements of the A-weighted airborne sound insulation of buildings from exterior sources shall generally follow the guidelines in ASTM E 966. For the purpose of this standard, sound level differences measured in unoccupied units shall be normalized to a receiving room reverberation time of 1/2 second. Sound level differences measured in occupied units shall not be normalized to a standard reverberation time.

Sound Transmission Control

Sec. 3501. (a) General. In Group R Occupancies, wall and floor-ceiling assemblies separating dwelling units or guest rooms from each other and from public space such as interior corridors and service areas shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies.

The standards listed below are guideline standards and as such are not adopted as part of this code (see Sections 6002 and 6003).

1. ASTM E 90 and E 413, Laboratory Determination of Airborne Sound Transmission Class (STC)

2. ASTM E 492, Impact Sound Insulation.

3. ASTM E 336, Airborne Sound Insulation Field Test

(b) Airborne Sound Insulation. All such separating walls and floor-ceiling assemblies shall provide an airborne sound insulation equal to that required to meet a sound transmission class (STC) of 50 (45 if field tested).

Penetrations or openings in construction assemblies for piping, electrical devices, recessed cabinets, bathtubs, soffits, or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings.

Entrance doors from interior corridors together with their perimeter seals shall have a laboratory-tested sound transmission class (STC) rating of not less than 26 and such perimeter seals shall be maintained in good operating condition.

(c) Impact Sound Insulation. All separating floor-ceiling assemblies between separate units or guest rooms shall provide impact sound insulation equal to that required to meet an impact insulation class (IIC) of 50 (45 if field tested). Floor coverings may be included in the assembly to obtain the required ratings and must be retained as a permanent part of the assembly and may be replaced only by other floor covering that provides the same sound insulation required above.

(d) Tested Assemblies. Field or laboratory tested wall or floor-ceiling designs having an STC or IIC of 50 or more may be used without additional field testing when, in the opinion of the building official, the tested design has not been compromised by flanking paths. Tests may be required by the building official when evidence of compromised separations is noted.

(e) Field Testing and Certification. Field testing, when required, shall be done under the supervision of a professional acoustician who shall be experienced in the field of acoustical testing and engineering and who shall forward certified test results to the building official that minimum sound insulation requirements stated above have been met.

(f) Airborne Sound Insulation Field Tests. When required, airborne sound insulation shall be determined according to the applicable Field Airborne Sound Transmission Loss Test procedures. All sound transmitted from the source room to the receiving room shall be considered to be transmitted through the test partition.

(g) Impact Sound Insulation Field Test. When required, impact sound insulation shall be determined.

Sound Transmission Control Systems

Sec. 3502. Generic systems as listed in the Fire Resistance Design Manual, Twelfth Edition, dated August 1988, as published by the Gypsum Association may be accepted where a laboratory test indicates that the requirements of Section 3501 are met by the system.

B. NOISE CONTOUR MAPS (REDUCED SIZE)

EXISTING NOISE EXPOSURE CONTOURS

This noise exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

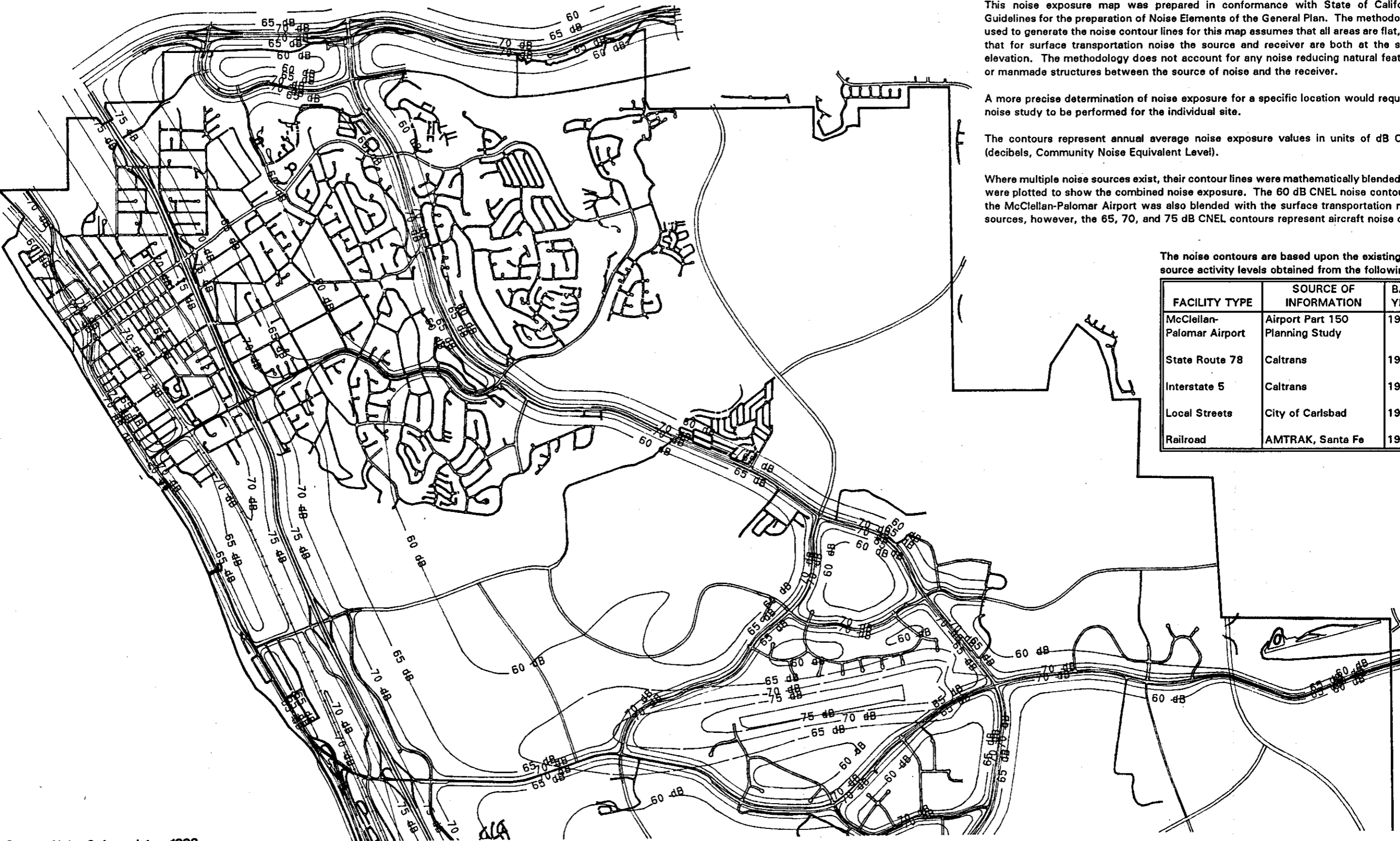
A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

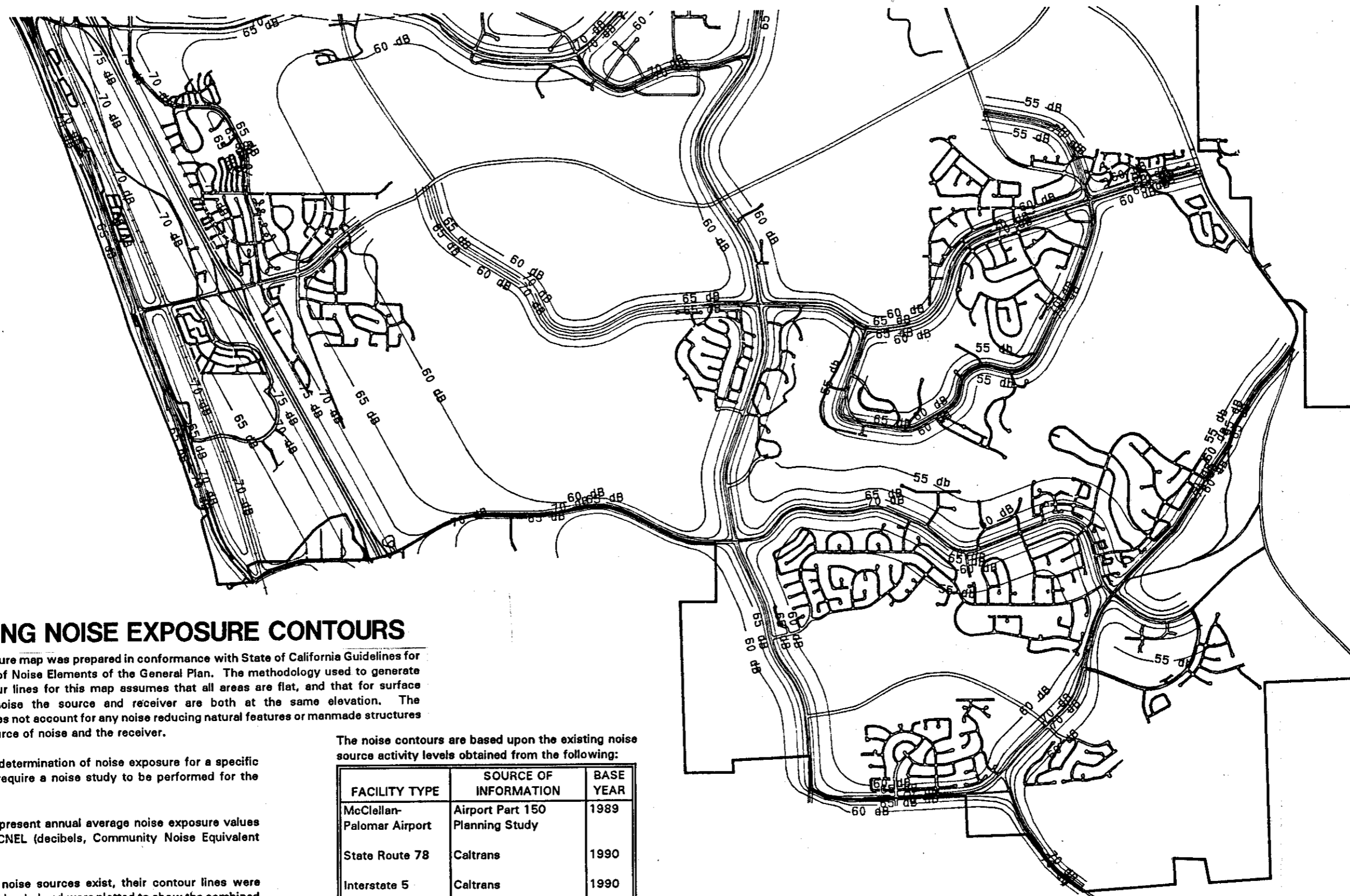
Where multiple noise sources exist, their contour lines were mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour to the McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70, and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	BASE YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1989
State Route 78	Caltrans	1990
Interstate 5	Caltrans	1990
Local Streets	City of Carlsbad	1990
Railroad	AMTRAK, Santa Fe	1990



Source: Nolte & Associates, 1993



EXISTING NOISE EXPOSURE CONTOURS

This noise exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

Where multiple noise sources exist, their contour lines were mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour to the McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70, and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	BASE YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1989
State Route 78	Caltrans	1990
Interstate 5	Caltrans	1990
Local Streets	City of Carlsbad	1990
Railroad	AMTRAK, Santa Fe	1990

Source: Nolte & Associates, 1993

SHEET 2 OF 2

FUTURE NOISE EXPOSURE CONTOURS

This exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

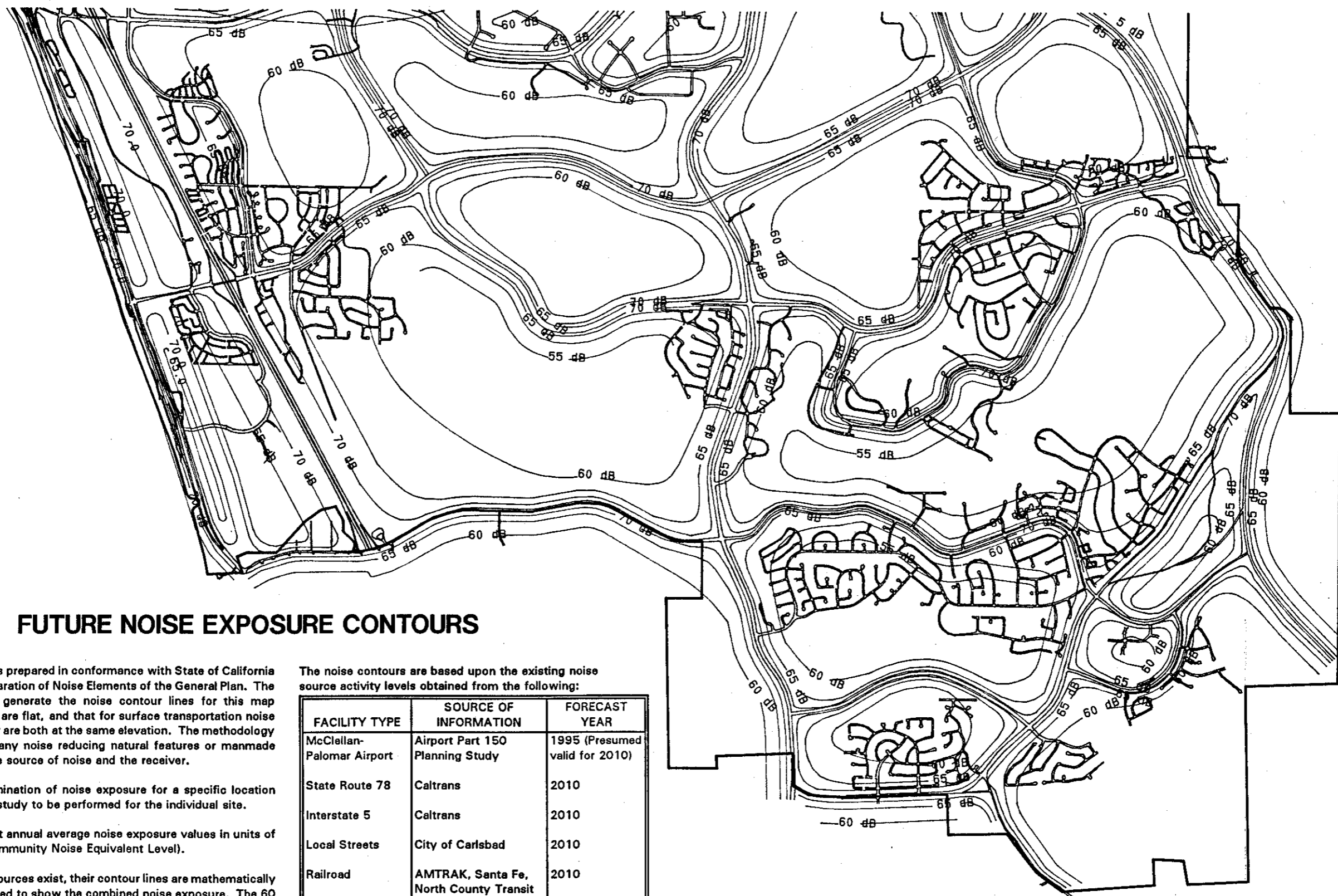
A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

Where multiple noise sources exist, their contour lines are mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour for McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70 and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	FORECAST YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1995 (Presumed valid for 2010)
State Route 78	Caltrans	2010
Interstate 5	Caltrans	2010
Local Streets	City of Carlsbad	2010
Railroad	AMTRAK, Santa Fe, North County Transit Development	2010



FUTURE NOISE EXPOSURE CONTOURS

This exposure map was prepared in conformance with State of California Guidelines for the preparation of Noise Elements of the General Plan. The methodology used to generate the noise contour lines for this map assumes that all areas are flat, and that for surface transportation noise the source and receiver are both at the same elevation. The methodology does not account for any noise reducing natural features or manmade structures between the source of noise and the receiver.

A more precise determination of noise exposure for a specific location would require a noise study to be performed for the individual site.

The contours represent annual average noise exposure values in units of dB CNEL (decibels, Community Noise Equivalent Level).

Where multiple noise sources exist, their contour lines are mathematically blended and were plotted to show the combined noise exposure. The 60 dB CNEL noise contour for McClellan-Palomar Airport was also blended with the surface transportation noise sources, however, the 65, 70 and 75 dB CNEL contours represent aircraft noise only.

The noise contours are based upon the existing noise source activity levels obtained from the following:

FACILITY TYPE	SOURCE OF INFORMATION	FORECAST YEAR
McClellan-Palomar Airport	Airport Part 150 Planning Study	1995 (Presumed valid for 2010)
State Route 78	Caltrans	2010
Interstate 5	Caltrans	2010
Local Streets	City of Carlsbad	2010
Railroad	AMTRAK, Santa Fe, North County Transit Development	2010

Source: Nolte & Associates, 1993

SHEET 2 OF 2

C. VEHICULAR NOISE ASSESSMENT

C. VEHICULAR NOISE ASSESSMENT

1. FHWA-RD-77-108

The City of Carlsbad accepts the Federal Highway Administration's (FHWA) methodology for vehicular noise prediction, as modified for CNEL, and "CALVENO" energy curves which represent the noise output of typical California motor vehicles.

The paragraph below is an abstract of the pertinent document (FHWA-RD-77-108 Highway Traffic Noise Prediction Model):

This report presents the FHWA method for predicting noise generated by constant speed highway traffic. The report is intended to be a users manual as well as a reference document detailing the development, use, and limitations of the prediction method. In the main body of the report, the prediction procedure is presented in a step-by-step fashion and includes numerous example problems designed to highlight important concepts and features. For those interested in the theoretical development of the model, an extremely detailed derivation is presented in the appendices. The basis of the model is the equivalent sound level, L_{eq} , although an adjustment for conversion to L_{10} is provided. The method incorporates three classes of vehicles: automobiles, medium trucks, and heavy trucks. Adjustments for absorptive groundcovers and finite length barriers are also included. Certain special topics such as nonuniform highway sites and determination of equivalent day-night levels, L_{dn} , are also included.

The publication date of FHWA-RD-77-108 was December 1978. Due to the length of this document, it is not reprinted in this Manual.

2. Hard (Reflective) Sites - Soft (Absorbing) Sites¹

The manner in which noises varies with distance is a function of many factors, one being the path which the noise travels. "Soft" sites, which correspond to a decrease of 4.5 decibels per doubling of distance (abbreviated 4.5 dB/DD), occur when there are absorbing characteristics such as soft ground, intervening structures and vegetation between the source and receiver, AND when both the source and receiver are located close to the ground. Most other cases are considered by the City to be "hard" sites, which corresponds to a decrease of 3 decibels per doubling of distance (abbreviated 3 dB/DD). However, any empirically determined dB/DD drop-off rate may be used if based on accepted field measurements.

Special instances may occur in which the change in noise level over distance is neither "hard" nor "soft", particularly in the case of stationary noise sources. In these cases, each drop-off rate will be individually identified and justified.

For traffic noise, the City enforces the guidelines for determination of hard/soft site analyses as set forth in the Federal Highway Administration's "Highway Traffic Noise Prediction Model, FHWA-RD-77-108".

¹ For consistency, the terms "Hard" and "Soft" sites will be used, in accordance with FHWA methodology

The City considers all sites "hard" sites unless situation 3.b in the following DETERMINATION OF "HARD" SITE VERSUS "SOFT" SITE exists, in which case a "soft" site analysis is applicable.

3. Determination of "Hard" Site Versus "Soft" Site

DETERMINATION OF "HARD" SITE VERSUS "SOFT" SITE (Criteria for Selection of Drop-Off Rate per Doubling of Distance¹)

	<u>Situation</u>	<u>Drop-Off Rate</u>	<u>Site Class</u>
1.	All situations in which the source or the receiver are located 3 meters above the ground or whenever the line-of-sight* averages more than 3 meters above the ground.	3 dB/DD	Hard
2.	All situations involving propagation over the top of a barrier 3 meters or more in height.	3 dB/DD	Hard
3.	Where the height of the line-of-sight is less than 3 meters and		
a.	There is a clear (unobstructed) view of the highway, the ground is hard, and there are no intervening structures.	3 dB/DD	Hard
b.	The view of the roadway is interrupted by isolated buildings, clumps of bushes, scattered trees, or the intervening ground is soft or covered with vegetation.	4.5 dB/DD	Soft

*The line-of-sight is a direct line between the noise source nominal height and the observer's ear height (1.5 meters or 5 feet above ground).

EXAMPLE

A	B	C	D
0	0	0	0
50	100	200	400

DISTANCE IN FEET

Let the average A-weighted sound level at point A be 70 decibels.

Using a "Hard" site analysis, the sound level will decrease at a rate of 3 dB/DD. Therefore, if the sound level is 70 decibels at point A, the sound levels at points B, C, and D will be 67 decibels, 64 decibels, and 61 decibels, respectively.

Using a "Soft" site analysis, the sound level will have a drop-off rate of 4.5 dB/DD. The sound levels at points B, C, and D will be 65.5 decibels, 61 decibels, and 56.5 decibels, respectively, again with the assumption that the sound level is 70 decibels at point A.

¹Excerpt from FHWA-RD-77-108.

4. City of Carlsbad Traffic Mix

In order to achieve the desired accuracy from computerized traffic noise prediction models, it is necessary to know the approximate proportion of certain motor vehicle types that comprise the typical population of vehicles using the roadway facilities in an area.

A physical count of vehicle types was conducted at several representative locations in Carlsbad to characterize the "mix" of vehicles. The computerized noise models are particularly sensitive to the percentage of trucks in the traffic flow, therefore, the "truck" components were carefully determined during the counting procedures.

The three vehicle types most generally used in noise modeling (and which were used in noise modeling for Carlsbad) are automobiles, including pickup trucks, light duty trucks, and motor homes; medium trucks, including busses; and heavy trucks (3 axle to 5+ axle), which includes dump trucks, trash trucks, semi trucks, etc.

The Carlsbad Traffic Vehicle Mix Study provided counts from seven locations. Approximately half of these count locations represented designated truck routes within the City. The locations are listed below:

- Carlsbad Boulevard - North of Poinsettia (Truck Route)
- La Costa Road - West End of Golf Course
- Palomar Airport Road - East of 5 Freeway (Truck Route)
- Rancho Santa Fe Road/Calle Barcelona (Truck Route)
- El Camino Real - South of College Boulevard (Truck Route)
- Tamarack Road/Adair
- Carlsbad Village Drive/Madison

The projected total Average Daily Traffic (ADT) from the study counts were compared to existing City traffic-count-based ADT to cross check count validity. Reasonable agreement was observed between study count data and existing City data.

The study count data was analyzed. It was observed that the "non truck route" and "truck route" facilities did carry appreciably different percentages of trucks. This would cause noticeable differences in the results of noise modeling.

We believe that noise modeling done in the City should use the appropriate "truck route" or "non truck route" vehicle mix to obtain the most representative vehicle noise impact values for City arterial highways. State of California highway vehicle mix data should be utilized for modeling State Highway 78 or Interstate 5.

The following summary matrix contains the typical vehicle mix percentages found on the City of Carlsbad arterial highways.

CARLSBAD TRAFFIC MIX			
Vehicle Category	Non Truck Route	Designated Truck Route	Average Total
Automobiles	97.89%	95.24%	96.38%
Medium Trucks	1.83%	3.52%	2.79%
Heavy Trucks	0.28%	1.24%	0.83%

The following information was obtained in order to cross check and compare the Carlsbad Traffic Mix Study results with data from other jurisdictions in the general area.

Typical San Diego Area Vehicle Mix Obtained from Various Agencies

- SAN DIEGO COUNTY
A = 93—98% MT = 1—7% HT = ½—4%
Range of mix values from Dr. Alex Segal, Noise Specialist
County of San Diego, Planning Department; February 25, 1992
- SAN DIEGO CITY
A = 96—97% MT = 2—3% HT = 1—2%
Range of mix values from Frank Haffner, Noise Specialist
City of San Diego Building Department; February 26, 1992
- SAN DIEGO CALTRANS 1990 EXISTING; ROUTE 76 BETWEEN FOUSSAT ROAD AND NORTH SANTA FE AVENUE (PEAK NOISE HOUR - LEVEL OF SERVICE C)
A = 97.41% MT = 1.82% HT = .77%
Report provided by Neal Davis, Caltrans District 11
Environmental Branch; February 26, 1992
- SAN DIEGO ASSOCIATION OF GOVERNMENTS (SANDAG)
A = 97.3% MT = 1.5% HT = 1.2%
From Regional Vehicle Occupancy and Classification Program
1990 Summary and 1985 Summary provided by Bill Tuomi, SANDAG; March 2, 1992
- TYPICAL ORANGE COUNTY AREA VEHICLE MIX
A = 97.41% MT = 1.85% HT = .74%
Orange County Environmental Management Agency. Annual Traffic Census, Average of 31 major intersections, 1975. Currently used for traffic noise modeling.

We believe that the regional data presented above does validate the results of the Carlsbad Traffic Mix Study.

YEAR 1990 CNEL NOISE CONTOUR DATA, CITY OF CARLSBAD

C-5

			***** Distance (ft) from Road Centerline to CNEL Contour*****				
Roadway	From	To	75 dB CNEL	70 dB CNEL	65 dB CNEL	60 dB CNEL	55 dB CNEL
I-5	SR-78	La Costa Ave	326	703	1514	3261	
SR-78	I-5	College Blvd		140	302	651	
Alga Rd	Poinsettia Ln	Melrose Dr		108	233	501	1080
Avenida Encinas	Cannon Rd	Palomar Airport Rd		108	233	501	1080
Avenida Encinas	Palomar Airport Rd	Poinsettia Ln		42	90	194	417
Avenida Encinas	Poinsettia Ln	Windrose		108	233	501	1080
Camino Vida Roble	Palomar Airport Rd	El Camino Real		42	90	194	417
Cannon Rd	Carlsbad Blvd	El Arbol		108	233	501	1080
Cannon Rd	El Arbol	Paseo Del Norte		108	233	501	1080
Cannon Rd	Paseo Del Norte	Car Country Drive		42	90	194	417
Carlsbad Blvd	N. City Limits	State St		108	233	501	
Carlsbad Blvd	State St	Mountain View Dr		42	90	194	
Carlsbad Blvd	Mountain View Dr	Tierra del Oro		108	233	501	
Carlsbad Blvd	Tierra del Oro	Palomar Airport Rd		42	90	194	
Carlsbad Blvd	Palomar Airport Rd	La Costa Ave		108	233	501	
College Blvd	Palomar Airport Rd	El Camino Real		108	233	501	
El Camino Real	SR-78	0.25 mi n/o Chestnut Ave		130	280	603	
El Camino Real	0.25 mi n/o Chestnut Ave	Cougar Dr		108	233	501	
El Camino Real	Cougar Dr	0.5 mi s/o Camino Vida Roble		130	280	603	
El Camino Real	0.5 mi s/o Camino Vida Roble	Dove Ln		108	233	501	
El Camino Real	Dove Ln	Levante St		130	280	603	
El Camino Real	Levante St	Olivenhain Rd		108	233	501	
El Fuerte St	Alga Rd	Alicante Rd		42	90	194	417
Carlsbad Village Dr	Ocean St	Carlsbad Blvd		42	90	194	417
Carlsbad Village Dr	Carlsbad Blvd	Pontiac Dr		108	233	501	1080
Carlsbad Village Dr	Pontiac Dr	Chatham Rd		42	90	194	417
Carlsbad Village Dr	Chatham Rd	Tamarack Ave		108	233	501	1080

YEAR 1990 CNEL NOISE CONTOUR DATA, CITY OF CARLSBAD

			***** Distance (ft) from Road Centerline to CNEL Contour*****				
Roadway	From	To	75 dB CNEL	70 dB CNEL	65 dB CNEL	60 dB CNEL	55 dB CNEL
Carlsbad Village Dr	Tamarack Ave	Glasgow Dr		42	90	194	417
Faraday Ave	College Blvd	Orion St		108	233	501	
Kelly Dr	Park Dr	El Camino Real		42	90	194	417
La Costa Ave	El Camino Real	Camino de los Coches		108	233	501	1080
Marron Rd	Jefferson St	El Camino Real		108	233	501	1080
Marron Rd	El Camino Real	Avenida de Anita		42	90	194	417
Melrose Dr	Alga Rd	Corintia St		130	280	603	
Melrose Dr	Corintia St	Rancho Santa Fe Rd		108	233	501	
Monroe St	Carlsbad Village Dr	Marron Rd		108	233	501	1080
Olivenhain Rd	El Camino Real	Amargosa Dr		42	90	194	
Olivenhain Rd	Amargosa Dr	Rancho Santa Fe Rd		108	233	501	
Palomar Airport Rd	Carlsbad Blvd	I-5		42	90	194	
Palomar Airport Rd	I-5	Paseo Del Norte		108	233	501	
Palomar Airport Rd	Paseo Del Norte	Yarrow Dr		130	280	603	
Palomar Airport Rd	Yarrow Dr	Loker Ave		108	233	501	
Palomar Airport Rd	Loker Ave	East City Limits		42	90	194	
Paseo Del Norte	Cannon Rd	Camino del Parque		108	233	501	1080
Paseo Del Norte	Camino del Parque	Poinsettia Ln		42	90	194	417
Poinsettia Ln	Carlsbad Blvd	Paseo Del Norte		42	90	194	
Poinsettia Ln	Paseo Del Norte	Alga Rd		108	233	501	
Rancho Santa Fe Rd	Melrose Dr	La Costa Ave		42	90	194	
Rancho Santa Fe Rd	La Costa Ave	Olivenhain Rd		130	280	603	
Rancho Santa Fe Rd	Olivenhain Rd	South City Limits		42	90	194	
Tamarack Ave	Carlsbad Blvd	I-5		42	90	194	417
Tamarack Avelage Dr	I-5	Adams St		108	233	501	
Tamarack Ave	Adams St	El Camino Real		42	90	194	

YEAR 2010 CNEL NOISE CONTOUR DATA, CITY OF CARLSBAD

			***** Distance (ft) from Road Centerline to CNEL Contour*****				
Roadway	From	To	75 dB CNEL	70 dB CNEL	65 dB CNEL	60 dB CNEL	55 dB CNEL
I-5	SR-78	La Costa Ave	374	807	1738	3744	
SR-78	I-5	College Blvd		179	386	832	
Alga Rd	Poinsettia Ln	El Camino Real		77	166	358	770
Alga Rd	El Camino Real	Melrose Dr		219	471	1015	
Camino de los Coches	Rancho Santa Fe Rd	La Costa Ave		77	166	358	770
Camino Vida Roble	Palomar Aiarport Rd	El Camino Real		77	166	358	770
Cannon Rd	Carlsbad Blvd	I-5		97	209	450	
Cannon Rd	I-5	East City Limits		115	247	533	
Carlsbad Blvd	North City Limits	Grand Ave		142	307	661	
Carlsbad Blvd	Grand Ave	Carlsbad Village Dr		154	331	713	
Carlsbad Blvd	Carlsbad Village Dr	Poinsettia Ln		142	307	661	
Carlsbad Blvd	Poinsettia Ln	La Costa Ave		154	331	713	
College Blvd	Marron Rd	Poinsettia Ln		115	247	533	
El Camino Real	SR-78	Marron Rd		280	603	1298	
El Camino Real	Marron Rd	Chestnut Ave		229	494	1063	
El Camino Real	Chestnut Ave	La Costa Ave		280	603	1298	
El Camino Real	La Costa Ave	Olivenhain Rd		229	494	1063	
El Fuerte St	Faraday Ave	Alicante Rd		77	166	358	770
Carlsbad Village Dr	Carlsbad Blvd	I-5		97	209	450	
Carlsbad Village Dr	I-5	Tamarack Ave		77	166	358	770
Faraday Ave	Cannon Rd	College Blvd		47	102	219	417
Faraday Ave	College Blvd	Melrose Dr		77	166	358	770
Kelly Dr (Hidden Valley)	Palomar Airport Rd	Cannon Rd		77	166	358	770
La Costa Ave	Carlsbad Blvd	I-5		115	247	533	
La Costa Ave	I-5	Saxony Rd		154	331	713	
La Costa Ave	Saxony Rd	El Camino Real		142	307	661	
La Costa Ave	El Camino Real	Melrose Dr		115	247	533	

YEAR 2010 CNEL NOISE CONTOUR DATA, CITY OF CARLSBAD

			***** Distance (ft) from Road Centerline to CNEL Contour*****				
Roadway	From	To	75 dB CNEL	70 dB CNEL	65 dB CNEL	60 dB CNEL	55 dB CNEL
Marron Rd	Jefferson St	East City Limits		77	166	358	
Melrose Dr	Faraday Ave	Questhaven		115	247	533	
Melrose Dr	Questhaven	South City Limits		115	247	533	
Monroe St	Marron Rd	Carlsbad Village Dr		77	166	358	770
Olivenhain Rd	El Camino Real	Rancho Santa Fe Rd		280	603	1298	
Palomar Airport Rd	Carlsbad Blvd	I-5		280	603	1298	
Palomar Airport Rd	I-5	Camino Vida Roble		229	494	1063	
Palomar Airport Rd	Camino Vida Roble	Business Park Dr		280	603	1298	
Paseo Del Norte	Cannon Rd	Poinsettia Ln		77	156	358	
Poinsettia Ln	Carlsbad Blvd	Melrose Dr		115	247	533	
Rancho Santa Fe Rd	Melrose Dr	Olivenhain Rd		229	494	1063	
Rancho Santa Fe Rd	Olivenhain Rd	South City Limits		115	247	533	
Tamarack Ave	Carlsbad Blvd	I-5		56	120	259	
Tamarack Ave	I-5	0.5 mi w El Camino Real		47	102	219	471
Tamarack Ave	0.5 mi w El Camino Real	Carlsbad Village Dr		77	166	358	770

D. RAIL NOISE ASSESSMENT

D. RAIL NOISE ASSESSMENT

Railroad Noise Assessment - Wyle Laboratories Report WCR 73-5

The City of Carlsbad has accepted a methodology for rail noise assessments as contained in Wyle Laboratories Report WCR 73-5.

The report, entitled "Assessment of Noise Environments Around Railroad Operations," is summarized in the following abstract from the document:

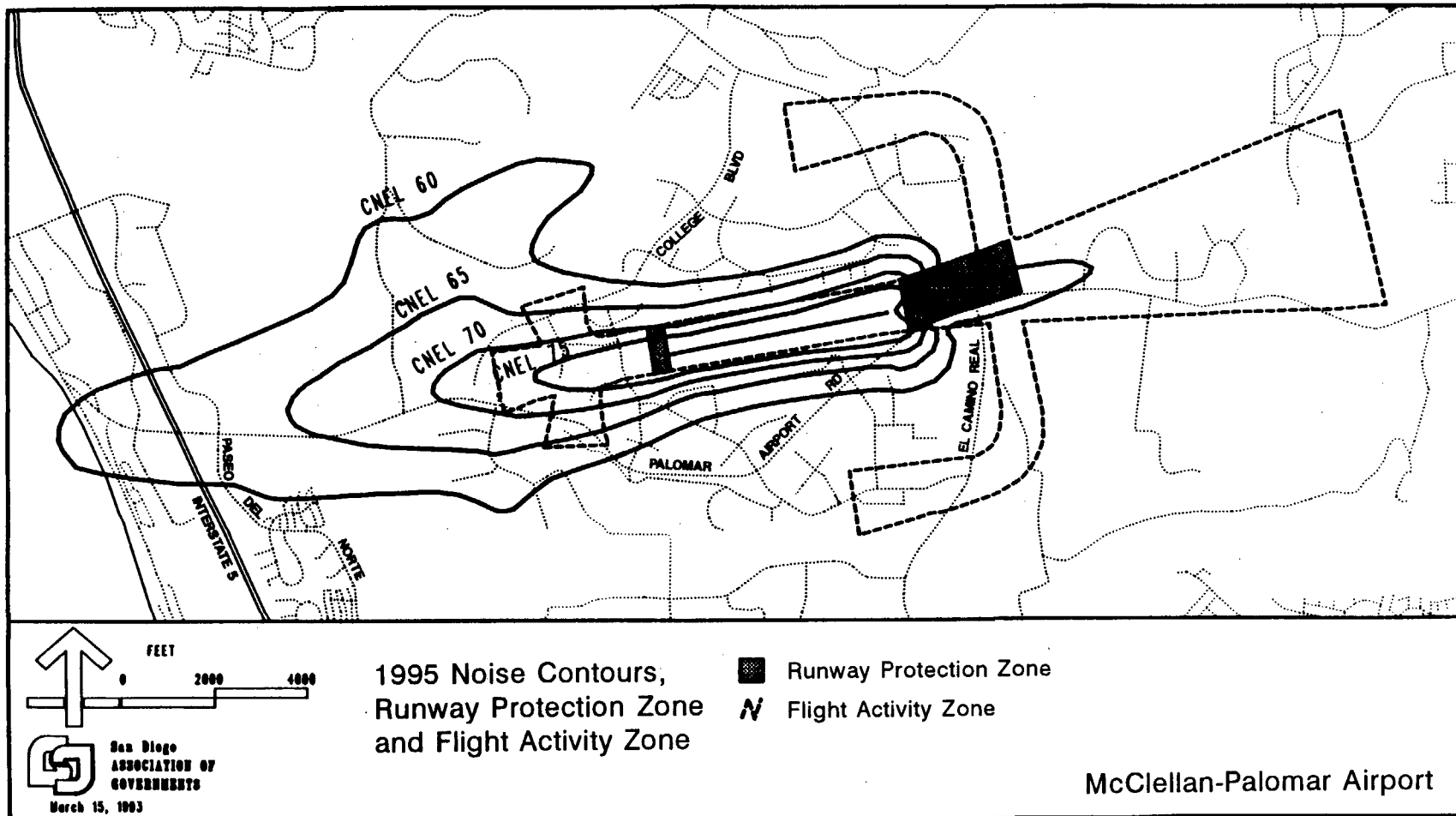
In recognition of the need for assessment of the noise emitted by railroad operations, this report has been prepared under sponsorship of Southern Pacific Transportation Company, Union Pacific Railroad, Atchison, Topeka and Santa Fe Railway Company, and Association of American Railroads. The report is intended to provide substantial background data to aid Federal rule making efforts on railroad noise and to satisfy the requirements for "Noise Elements" in the State of California, Government Code Section 65302(g). (Senate Bill 691)...in satisfaction of these requirements. This report incorporated A-weighted noise measurements of both line and yard operations, and weights their duration in terms of total integrated sound energy for each event or combined series of events. Additionally, a methodology has been presented for application to line and yard operations which allows inclusion of weighting factors for time of day of the noise event and numbers of events during defined time periods.

The publication date of this document was July 1973.

Due to the length of the document, it is not reprinted in this manual.

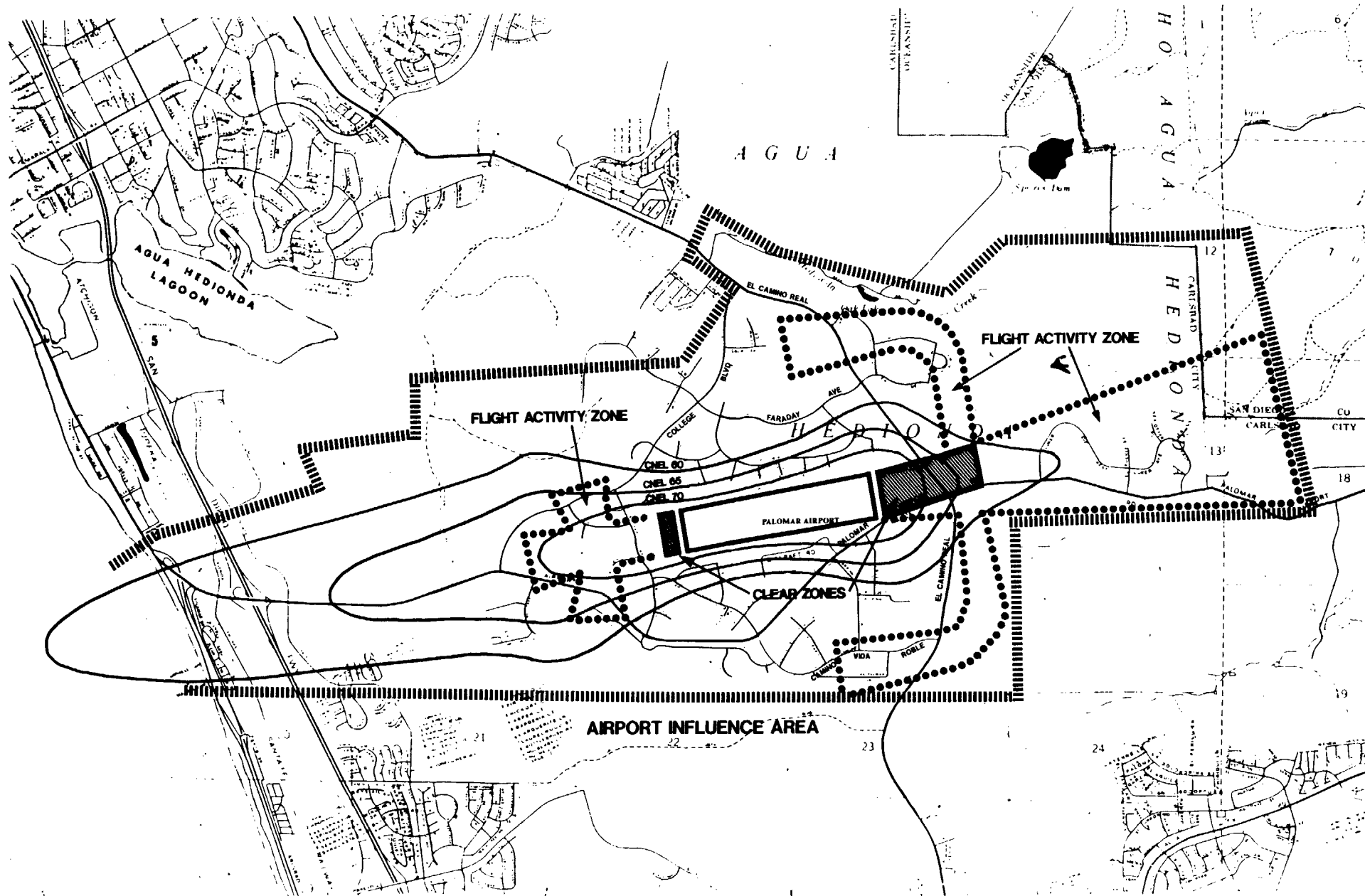
- Notes:
- (1) Other methodologies may be proposed and will be evaluated for possible inclusion into this Manual in accordance with procedures established for its periodic amendments.
 - (2) Predictions made by the procedures in Report WCR73-5, or other approved models, may be validated by measurements of sound levels and corresponding parameters such as average train speed, number of engines and cars, and distance from the track, etc.

E. McCLELLAN PALOMAR AIRPORT



1995 NOISE CONTOUR MAP OF MCCLELLAN PALOMAR AIRPORT

McClellan-Palomar Airport Airport Influence Area



**F. RELATIONSHIP OF NOISE ENERGY
AND NOISE PERCEPTION TO DECIBEL SCALE**

F. RELATIONSHIP OF NOISE ENERGY AND NOISE PERCEPTION TO DECIBEL SCALE¹

"Decibel" noise rating units are convenient, but may also be confusing because their mathematical behavior is not necessarily intuitive.

Decibels are convenient because they numerically compress a huge range of sound pressures (to which the ear is sensitive) into a smaller range of values between 0 dB(A) (threshold of hearing), 120 dB(A) (pain) to 140 dB(A) (hearing damage). They may be confusing because a doubling of sound energy is expressed by an increase of dB units from whatever dB value existed before the increase. For example, 63 dB represents twice as much sound energy as does 60 dB, 76 dB is twice as much energy as 73 dB, etc. Increases of less than double may also be represented (by a number smaller than 3 dB units) and decreases in noise energy may be similarly represented by a minus sign before the decibel value.

There is an additional factor which also contributes to confusion when discussing impact or significance of decibel changes. This factor is the subjective human perception of loudness as it relates to our assessment of "noise" (or sound). In general, for common sounds, a reasonable person of normal sensibilities will exhibit the following correspondence:

<u>Change of</u>	<u>Perception</u>
Plus 1 dB	Barely noticeable
Plus 2-3 dB	Somewhat louder
Plus 5 dB	Distinctly louder
Plus 8-9 dB	Twice as loud

Determinations of "Significance" of environmental noise increases are generally based upon the perceived changes in loudness in addition to absolute noise levels expressed in terms of L_{eq} , Day-Night Level (L_{DN}) or CNEL.

¹ Lecture on Environmental Noise, Rob Greene, Senior Acoustics Specialist, Bruel and Kjaer Instruments, Inc., Basic Acoustics Seminar, March 7, 1989.

G. CONSTRUCTION EQUIPMENT NOISE LEVELS

G. CONSTRUCTION EQUIPMENT NOISE LEVELS

Construction noise represents a short-term impact on ambient noise levels. Noise generated by heavy construction equipment can reach high levels. Noise levels of typical construction equipment are presented below. Note that the noise levels presented are for a close distance of 50 feet from equipment noise source to receiver. The noise levels shown decrease at a rate of approximately 6 dB per doubling of the distance. Therefore, at 100 feet, the noise levels will be about 6 dB less than at 50 feet. Similarly, at 200 feet, the noise levels would be 12 dB less than at 50 feet.

CONSTRUCTION EQUIPMENT NOISE LEVELS IN dB(A)				
Distance from Source				
Source	50 ft	100 ft	200 ft	400 ft
Heavy Trucks	84-89	78-83	72-77	66-71
Pickup Trucks	72	66	60	54
Dump Trucks	88	82	76	70
Concrete Mixer	85	79	73	67
Jackhammer	88	82	76	70
Scraper	80-89	74-82	68-77	60-71
Dozer	87-102	81-96	75-90	69-84
Paver	80-89	74-83	68-77	60-71
Generator	76	70	64	58
Shovel	91	85	79	73
Crane	75-88	69-82	63-76	55-70
Loader	73-86	67-80	61-74	55-68
Grader	88-91	82-85	76-79	70-73
Caterpillar	88	82	76	70

H. PROFESSIONAL QUALIFICATIONS FOR ACOUSTICAL CONSULTANTS

**H. PROFESSIONAL QUALIFICATIONS
FOR ACOUSTICAL CONSULTANTS (City of Carlsbad)**

- A. Either I: A degree in engineering, physics or a closely related field, and four (4) years acoustical engineering experience;

Or II: An equivalent combination of education and relevant experience as determined by the City of Carlsbad;

AND

Either A: Is a Registered Engineer in the State of California;

Or B: Has passed the Institute of Noise Control Engineering (INCE) Professional Examination.

OR

- B. Is certified as an Acoustical Consultant by the County of San Diego, the County of Orange or other jurisdiction with comparable requirements.

I. FORMS

RECORDING REQUESTED BY AND)
WHEN RECORDED RETURN TO)
City Clerk)
City of Carlsbad)
1200 Carlsbad Village Drive)
Carlsbad, CA 92008)
)

Space above this line for Recorder's use

Parcel No. _____

NOTICE AND WAIVER CONCERNING PROXIMITY
OF THE PLANNED OR EXISTING

_____ TRANSPORTATION CORRIDOR(S)
CASE NO: _____

This Notice Concerning Environmental Impacts is made by _____
_____, a(n) _____, hereinafter referred to as
(name of legal owner) (individual, corporation, etc.)
the "Owner" is developer of certain real property situated in the City of Carlsbad, County
of San Diego, State of California.

RECITALS

A. The purpose of this notice is to disclose to the fullest extent possible present and future potential impacts of noise generated by all manner of vehicles including public and private vehicles which will generate noise and other environmental impacts. Purchaser acknowledges and accepts these existing and future impacts and forever waives any and all causes of action and covenants not to sue the City of Carlsbad, its agents, servants or employees as to any damages or injuries resulting from said impacts.

B. The Owner is the developer and/or holder of the title to certain real property in the City of Carlsbad, County of San Diego, California, more fully described as:

C. The property is located adjacent to the _____ Transportation Corridor (hereafter described as corridor) on which transportation vehicles such as automobiles, trucks, motorcycles and/or vehicles for rail and transit are proposed to travel.

NOISE FORM #1

FORM: NOISE 1: 2 of 3

D. The property has been developed in compliance with City and State Noise criteria which may include mitigation in the form of setbacks, earthen berms, masonry walls and/or structure upgrades.

E. Owner has no control over the operations of the corridor including the types of vehicles, trips and traffic, nor the frequency of the trips.

F. It is the desire of Owner to give notice to any potential purchaser of the real property of its proximity to the corridor and the fact that purchases may be subject to the impacts of said proposed transportation corridor.

NOW, THEREFORE, in light of the above Recitals, owner does, for itself, and its successors and assigns, give the following notice and makes the following waiver:

1. Owner has and shall develop the property in accordance with a Subdivision Tract/Parcel Map (CT/PM - _____) approved by the City of Carlsbad, which approval includes the requirement of the City of Carlsbad, that the development of the property is consistent with the Land Use & Noise Element of the General Plan of the City of Carlsbad.

2. That Owner has no responsibility or control over the operation of the corridor, including without limitation, the types or number of vehicles operating on the corridor.

3. That the vehicle operations on the corridor may create significant impacts affecting the purchasers, tenants and occupants of the property and that purchasers, tenants and occupants of the property reside there subject to sight and sound of vehicle operation.

4. The property shall be held, conveyed, hypothecated, encumbered, leased, rented, used, occupied and improved subject to this Notice. This Notice shall run with the property and shall be binding upon all parties having or acquiring any right, title or interest in the property.

5. The purpose of this notice is to disclose to the fullest extent possible present and future potential impacts of noise generated by all manner of vehicles including public and private vehicles which will generate noise and other environmental impacts. Purchaser acknowledges and accepts these existing and future impacts and forever waives any and all causes of action and covenants not to sue the City of Carlsbad, its agents, servants or employees as to any damages or injuries resulting from said impacts.

...

NOISE FORM #1

FORM: NOISE 1: 3 of 3

Executed this _____ day of _____, 19_____.

*OWNER:

(name of *Owner)

By: _____
(sign here)

(print name here)

(title and organization of signatory)

By: _____
(sign here)

(print name here)

(title and organization of signatory)

(Proper notarial acknowledgment of execution by *OWNER must be attached.)

(President or vice-president **and** secretary or assistant secretary must sign for corporations. If only one officer signs, the corporation must attach a resolution certified by the secretary or assistant secretary under corporate seal empowering that officer to bind the corporation.)

Approved as to form:

RONALD R. BALL
City Attorney

By _____

NOISE FORM #1

RECORDING REQUESTED BY AND
WHEN RECORDED RETURN TO
City Clerk
City of Carlsbad
1200 Carlsbad Village Drive
Carlsbad, CA 92008

Space above this line for Recorder's use

Parcel No. _____

**NOTICE CONCERNING AIRCRAFT
ENVIRONMENTAL IMPACTS
CASE NO:**

This Declaration and Notice Concerning Aircraft Environmental Impacts is made by _____, a(n) _____, hereinafter (name of legal owner) (individual, corporation, etc.) referred to as the "Owner", as developer of certain real property situated in the City of Carlsbad, County of San Diego, State of California.

RECITALS

- A. The Owner is the developer and holder of the title to certain real property in the City of Carlsbad, County of San Diego, California, more fully described as:
- B. The property is located approximately _____ miles from the McClellan-Palomar Airport, City of Carlsbad, San Diego County (the "Airport"), operated by the County of San Diego, through which are conducted certain aircraft operations on and about said Airport and over real property in the vicinity of the Airport.
- C. Owner has no control over the operations of the Airport, including the types of aircraft, flight, the flight patterns of the aircraft, nor the frequency of the flights.

NOISE FORM #2

rev. 3/27/95

- D. It is the desire of Owner to give notice to any potential purchaser of the real property of the air flight operation and the fact that purchasers may be subject to overflight, sight and sound of aircraft operating to or from the Airport.
- E. The purpose of this notice is to disclose to the fullest extent possible present and future potential impacts of noise generated by all manner of aircraft including public, military and private aircraft which will generate noise and other environmental impacts.

NOW, THEREFORE, in light of the above Recitals, as developer and owner of the property, does, for itself, and its successors and assigns, give the following notice:

1. Owner has and shall develop the property in accordance with Subdivision Tract Parcel Map (CT/PM - _____) approved by the City of Carlsbad, which approval includes the requirement of the City of Carlsbad, that the development of the property is consistent with the Land Use Element and Noise Element of the General Plan of the City of Carlsbad.
2. That Owner has no responsibility or control over the operation of the Airport, including without limitation, the types or number of flight operations, types of aircraft (including jet aircraft), timing of flight operation, or frequency of flights.
3. That the flight operations to the Airport may create significant aircraft environmental impacts affecting the purchasers, tenants and occupants of the property and that purchasers, tenants and occupants of the property reside there subject to such overflight, sight and sound.
4. The property shall be held, conveyed, hypothecated, encumbered, leased, rented, used, occupied and improved subject to this Declaration and Notice. This Notice shall run with the property and shall be binding upon all parties having or acquiring any right, title or interest in the property.
5. The purpose of this Notice is to disclose to the fullest extent possible present and future potential impacts of noise generated by all manner of aircraft including public and private aircraft which will generate noise and other environmental impacts.

...

NOISE FORM #2

rev. 3/27/95

Executed this _____ day of _____, 19_____.

***OWNER:**

(name of *Owner)

By: _____
(sign here)

(print name here)

(title and organization of signatory)

By: _____
(sign here)

(print name here)

(title and organization of signatory)

(Proper notarial acknowledgment of execution by *OWNER must be attached.)

(President or vice-president **and** secretary or assistant secretary must sign for corporations. If only one officer signs, the corporation must attach a resolution certified by the secretary or assistant secretary under corporate seal empowering that officer to bind the corporation.)

Approved as to form:

RONALD R. BALL
City Attorney

By _____

NOISE FORM #2

rev. 3/27/95

AIRCRAFT NOISE NOTIFICATION SIGNS

The adopted formats for satisfaction of aircraft noise impact notification sign requirements are illustrated on Page I-8 and I-9. The description of the graphical sign is as follows:

1. The sign shall be a minimum of 18" tall by 12" wide;
2. The background shall be dark blue;
3. The text and graphics shall be white or silver;
4. All graphic symbols including the plane silhouette and sound waves shall be on the sign;
5. The text shall consist of the words "AIRCRAFT NOISE IMPACT AREA" in 1½ inch block style letters as shown on Exhibit IV-1;
6. The signs shall be fabricated in a professional manner.

An informational text sign as described below and illustrated on Exhibit IV-2 shall be located adjacent to the graphical sign:

- a. The sign shall be 18" tall by 12" wide;
- b. The background shall be white;
- c. The text shall be black;
- d. The text shall consist of verbiage as shown on Page I-9;
- e. The signs shall be fabricated in a professional manner.

The requirement for aircraft noise notification signs will be applied to all new residential developments located within the 60 dB CNEL contour generated by the airport as shown on the adopted future (2010) Noise Contour Map, and shall be posted in a conspicuous manner in all sales offices associated with said development.



**AIRCRAFT NOISE
IMPACT AREA**

NOTICE OF AIRCRAFT NOISE IMPACT AREA

New residential development property included within tract(s) _____ and offered for sale by this office is located approximately _____ miles(s) _____ (north, south, east, west) of McClellan-Palomar Airport, City of Carlsbad.

The property is within 3 miles of McClellan-Palomar Airport. Residents of this area may frequently see, hear, and have interference of certain activities by aircraft operating to and or from McClellan-Palomar Airport. McClellan-Palomar Airport generally operates 24 hours per day.

A Notice Concerning Aircraft Environmental Impacts has been recorded for this project.

The purpose of this notice is to disclose to the fullest extent possible present and future potential impacts of noise generated by all manner of aircraft including public and private aircraft which will generate noise and other environmental impacts.

For more information, please see your sales representative at _____.

J. NOISE REPORT APPLICATION AND CHECKLIST

NOISE REPORT SUBMITTAL FORM

Exhibit VI-4

Acoustical Analysis Report No.: _____	Project No. _____	Type of Acoustical Analysis Report
Project Address: <i>(Street Address/Tract No.)</i> _____ _____ _____	_____ () _____ () _____ () _____ ()	Feasibility Noise Report One-Step Complete Noise Report Phased Noise Report

() No report necessary. The project will satisfy all City of Carlsbad noise exposure limits without a formal analysis and report. Explanation:

This submittal is for:	<u>Noise Reduction</u>
() Tentative Tract/Parcel Map Approval () Issuance of Grading Permits: Mass/Precise () Final Map Recordation () Issuance of Building Permits () ()	() Topography Modification () Berming () Berm/Wall Combination () Freestanding Sound Wall () Patio Walls () Balcony Walls () Upgraded Windows () Mechanical Ventilation () None required

_____ 3 copies of Noise Report (one with computer calculations _____)

_____ copy of project floor plans (1" = 40' minimum scale)

_____ copy of project plot plan (1" = 40' minimum scale) folded in 8½ x 11 or 8½ x 14 format.

Contact for Information/Clarification: at _____ at _____

(Name) (Phone No.)

Date: _____ Submitted by: _____

STATEMENT OF ACOUSTICAL CONSULTANT

All information and calculations contained herein are true and correct to the best of my knowledge. The project is designed to meet existing acoustical requirements as determined by the City of Carlsbad.

I have supervised the preparation of this noise study. I am a City/County Certified Acoustical Consultant.

Date: _____ Signed: _____

FOR CITY USE ONLY

Submittal received and accepted for review:	
Date: _____	By: _____
Acoustical Report reviewed and additional information requested:	
Date: _____	By: _____
Acoustical Report accepted as complete and adequate:	
Date: _____	By: _____

APPLICATION REQUIREMENTS FOR NOISE REPORT APPLICATION

Noise Report Submittal Requirements

1. Submit completed Noise Report Applicationas Form specified by the City, stating the reason for submittal of the report (e.g., grading/recordation, building permits, etc.).
2. Submit three copies of the noise report to the City. One copy shall be complete with calculations, two copies may be summary reports.
3. Certify that the acoustical report is true and accurate.

Noise Report Contents

The following should be included in a complete Noise Report:

- ☐ Uniquely identify each report by a report number. (Typically, the acoustical consultant will number the report in reference to his own accounting system. This number, shall distinguish each report from subsequent reports or revisions.)
- ☐ Include the City-issued project identification number (e.g., Conditional Use Permit, Planned Unit Development, Tentative Tract, Parcel Map, etc. on the Noise Report).
- ☐ Provide a street address (where one has been assigned), or nearest cross streets plus distance and direction from intersection thereof, or other common description of project location.
- ☐ Provide a vicinity map clearly showing the site of the development.
- ☐ Identify the noise standards that apply to the project. For example "State Noise Insulation Standards," "City Standard 60 dB CNEL Exterior," etc.
- ☐ Provide a legible plot plan (and floor plan) at a scale not less than 1 inch = 40 feet, folded in an 8-1/2 x 11 inch format.
- ☐ The methodology used for measurement or prediction of motor vehicle noise levels shall be stated. The procedures in FHWA-RD-77-108, as modified for California (CALVENO curve and CNEL), must be used for traffic noise prediction, with all variables identified, and justified where appropriate (e.g., absorptive (soft) or reflective (hard), gradient, stop-and-go conditions, number and width of travel lanes and medians, etc.).

Notes:

1. Vehicle speeds, ADT's and traffic mix, per level of service "C", shall be stated and source of information identified.
2. Equivalent distance, per the FHWA model for calculations of noise impact shall be used.
3. Centerline of roadway shall be used for reference distance to observer, structure, etc. (Do NOT use the centerline of the near travel lane for reference.)

4. No credit is permitted for future quieting of motor vehicle noise sources.
 5. CNEL shall be used, except for most non-residential projects, when L_{eq} for specified time period is required.
 6. On-site measurement data, if used to validate the predicted noise levels for an acoustical analysis, shall be adjusted to reflect the annualized ADT for the site prior to determination of "existing" noise impact levels. The dates, times and exact locations of the measurements shall be stated.
 7. Residential projects are to mitigate the projected buildout noise level to a maximum as described in Section II Noise Element Policies at 5 feet above finished grade level, 20' from the rear/side of the structure, unless the rear/side yard is less than 20' deep where the measurement shall be taken at the property line.
 8. Where exterior space above the first floor/story of a residential structure is proposed to be used to meet the Planned Development (PD) Recreational Space Standards as required pursuant to Chapter 21.45 of the Carlsbad Municipal Code. The exterior space shall be mitigated to the City Standard in order to receive credit as recreational space.
- ☐ Where applicable a detailed barrier analysis shall be submitted with the report, to include the following:
1. Location of source, barriers, useable outdoor living area, structures/dwellings, etc.
 2. Worst-case section view of site, including elevations, either scaled or dimensioned.
 3. Barrier geometry (NOTE: 5 foot observer height above datum and source heights per the FHWA model shall be used, except where modification is required by the City.
 4. Residential site to be mitigated to the City Noise Standard 20' from the rear/side of the structure, unless the rear/side yard is less than 20' deep where the measurement shall be taken at the property line.
 5. Discussion of the structural/construction details required to maintain acoustical integrity of the barrier, including treatment of penetrations, gates, etc.
- ☐ If railroad or aircraft noise affect the site, measurement of noise impact or the method of prediction shall be stated. Where CNEL contour maps are available, their use may be required by the City. If railroad or aircraft noises do not affect the site, so state.
- ☐ Indicate in tabular form the required sound transmission loss of windows, along with typical thickness and configuration, required to satisfy City standards for interior noise levels. When specifying windows of greater than 3/16 inch thickness, list one or more products by manufacturer's name and model number that will satisfy the acoustical requirements. (When glazing requirements exceed this thickness, the sound transmission loss will vary with each manufacturer. For example, one manufacturer's 1/4 inch thick window assembly may provide a transmission loss of 26 dB, while another manufacturer's 1/4 inch thick window assembly may only provide 23 dB of transmission loss).

- ☐ In the front of the report, include a "Summary" section on colored paper in which specifications and location of all sound attenuating design features or products shall be listed, preferably in a tabular form. List all items: DO NOT REFER TO TABLES IN TEXT OF REPORT.
- ☐ Include worksheets for composite wall analyses including transmission loss assumptions, unless the prescriptive A-weighted insertion losses of 20 dB (windows closed) or 12 dB (windows open) are used, as found in the City Noise Element of the General Plan.
- ☐ Specify in the text of report (preferably in tabular format) which residential structures and units, if any, require closed windows to meet interior noise standards and in such cases include the following paragraph:
- ☐ Where windows are required to be unopenable or kept closed in order to meet the interior noise standards, mechanical ventilation and cooling, if necessary, shall be provided to maintain a habitable environment. The system shall supply two air changes per hour to each habitable room including 20% (one-fifth) fresh make-up air obtained directly from the outdoors. The fresh air inlet duct shall be of sound attenuating construction and shall consist of a minimum of ten feet of straight or curved sound attenuating duct or six feet plus one sharp 90 degree bend.
- ☐ State the requirements for maintaining building shell acoustical integrity and enumerate items of a critical nature: e.g., tight-fit chimney damper, exhaust fan back-draft damper, no mail slot, full skirting for mobile-home coaches, air conditioning intake and exhaust ducting, etc. A through-the-wall air conditioner shall be treated as a separate component when calculating composite wall attenuation values.
- ☐ The following CNEL data shall be provided as appropriate:

Existing and Future CNEL, before noise reduction measures;

Worst-case outdoor living area CNEL/ L_{eq} , before noise reduction measures;

Worst-case CNEL/ L_{eq} incident upon structure prior to noise reduction measures; and

Worst-case interior CNEL/ L_{eq} after noise reduction by building components and/or exterior barriers.

NOISE REPORT: STAFF REVIEW CHECKLIST

- I. Verify that the standard Noise Report Submittal Form is attached and properly filled out. (See attached Appendix J for form)
- II. Verify that the report has been prepared in compliance with the minimum requirements contained in the Noise study and Report Section of the Noise Guidelines Manual.
- III. Check the following:
 - A. Vehicular noise impacts (unmitigated)
 - ☐ 1. Verify location of project with respect to latest adopted General Plan Noise Element Future Noise Contours including McClellan-Palomar Airport noise contours.
 - ☐ 2. FHWA RD-77-108 methodology utilized with CALVENO reference curves, and modification for CNEL or L_{eq} as appropriate for project.
 - ☐ 3. Soft/hard site parameter. Reflective (hard)/absorptive (soft) site condition criteria are strictly followed. All uses of soft-site analyses require justification. Second, or higher, floor is always considered hard-site.
 - ☐ 4. Source identity and date for Average Daily Traffic (ADT's) (Existing and Future) is stated and appears reasonable for highway type.
 - ☐ 5. Check average traffic speed, angle of view, roadway gradient, standard or truck vehicular mix, reference distance to centerline, site geometry, etc.
 - ☐ 6. Check internal traffic and noise generated by larger projects.
 - B. Railroad noise impacts (unmitigated)
 - ☐ 1. Verify location of project with respect to latest adopted General Plan Noise Element Existing or Future Noise Contours.
 - ☐ 2. Wyle methodology; or, Alternative methodology, specify document # or source; or, City's adopted General Plan Noise Element Contour Maps were utilized.
 - ☐ 3. If modeled, did consultant verify with the Train Master (who/date) the number of trains per day, approximate length (number of cars), approximate number of locomotives, speed, temporal split, etc.?
 - ☐ 4. If modeled, did consultant check with Train Master (who/date) for any unusual conditions at or near project site, e.g., routine horn usage for safety, etc.?

- ☐ 5. Was model calibrated by field measurements or not considered necessary?

C. Aircraft Noise Impacts (unmitigated)

- ☐ 1. Verify location of project with respect to latest adopted General Plan Noise Element Future Noise Contours including airport noise contours contained in the McClellan-Palomar Airport Comprehensive Land Use Plan.
- ☐ 2. Any other aircraft sources, e.g., helipad, helistop, military, etc.?

D. Other noise sources

- ☐ 1. Check to see if report addresses other noise sources near project: dog kennel, car wash, public safety or hospital facility, parking lot, commercial or retail centers, loading docks, air conditioner pool/spa pumps, industrial, manufacturing, or institutional activities, etc.
- ☐ 2. Check to see if report addresses potential land-use incompatibilities (i.e., residential uses adjacent to non-residential uses).
- ☐ 3. Check to see if report predicts project-generated noise.

- ☐ E. Check for compatibility with the combination of all noise sources.

IV. Check analyses of noise reduction measures.

A. Residential

1. Exterior noise levels

a. Private outdoor living areas

- ☐ (1) Yards

- ☐ (2) Patios

- ☐ (3) Balconies, mitigated, or

- ☐ (a) Exempt due to small size (less than 6 feet deep)

- ☐ (b) Exempt due to mandatory use for emergency egress

- b. Common outdoor living areas - barbecue areas, jacuzzi areas, tot lot, rest area, etc.

☐ (1) Barbecue areas, jacuzzi areas, tot lots, rest areas, etc.

2. Interior noise levels

☐ a. 45 dB CNEL in all habitable spaces (Residential Standard)

(1) Windows partially open yield 12 dB of Noise Reduction (standard construction)

(2) Windows closed yield 20 dB of Noise Reduction (standard construction)

(a) Mechanical ventilation requirement

(b) Cooling requirement

(c) Fresh air make-up requirement with sound attenuation

(3) Windows closed, required noise reduction over 20 dB

(a) Upgraded glazing - verify parameters and analyses

(b) Analysis with standard windows - verify parameters and analysis.

(c) Mechanical ventilation

(d) Cooling requirement

(e) Fresh air make-up requirement with sound attenuation

(f) Leaks, seals, weather stripping, etc.

(g) Other acoustical upgrades

B. Other Noise Sensitive Uses

☐ 1. Hotels/motels, fire stations, convents, boarding schools, board and care, nursing homes and hospitals contain some rooms which are classified as residential and some rooms which are classified as non-residential. Interior residential standards apply to habitable spaces.

☐ 2. Check for onsite noise generating conditions, such as mechanical equipment, internal project traffic, warning devices, etc.

C. Noise Reduction Measures (Exterior and Interior)

- ☐ 1. Verify data input parameters (elevations, distances, prescribed location of "observer," etc.)
- ☐ 2. Verify heights and location and expected noise attenuation performance of barrier(s).
 - ☐ a. If the calculated height of a required barrier is greater than permitted under Carlsbad Municipal Code, a project redesign is required, or a variance must be applied for.
 - ☐ b. Check that barrier height is specified above observer datum.
 - ☐ c. Check that on project plans the barrier design has been properly illustrated on exhibits and is specified.
- 3. Check for design errors
 - ☐ a. Barriers - decorative cut-outs, flanking paths, drainage openings, gates, insufficient design criteria and use of inappropriate material or construction technique.
 - ☐ b. Ventilation requirements not addressed, insufficient, or non-sound attenuating.
 - ☐ c. Fireplace, chimney damper, kitchen and bathroom exhaust vents, weather stripping, closures, seals, etc., not clearly specified.
 - ☐ d. Through-the-wall air conditioners should be analyzed for fresh air make-up and acoustical transmission loss performance.
- ☐ D. Check for inconsistencies within report. (Example: Verify that the noise reduction measures mentioned in text of the report are the same as those shown on the Exhibits and in the Summary).

V. Compliance with Environmental Documentation

- ☐ A. For projects with previous environmental review, check for any acoustical mitigation measures specified in Negative Declaration, Environmental Impact Report, Environmental Impact Statement, or Mitigation Monitoring Program to ensure that these measures are incorporated into the project.
- ☐ B. Ensure that acoustical mitigations addressed in the noise report are recommended for incorporation into the project.